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## The economic benefits of ambulatory surgery relative to inpatient surgery for laparoscopic tubal ligation

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### Abstract

This prospective economic study aims to evaluate the costs of both outpatient and inpatient laparoscopic tubal ligation (LTL) and compares this with the price proposed by the Institute for Informatics and Financial Health Management (Instituto de Gestão Informática e Financeira da Saúde (IGIFS)). The study included 24 patients, all candidates for a day surgery programme, assigned to two groups of 12 patients: GROUP A (ambulatory surgery (AS)) and GROUP I (inpatient). A highly significant statistical difference was found ( $P < 0.01$ ) between the average surgery times for the two groups: GROUP A = 26.75 min, and GROUP I = 45.42 min. The study showed an average saving of 62.4% (€593.22) for each LTL performed on an outpatient basis compared with the inpatient regime. Extrapolating these results to all LTL procedures, the authors concluded that there would have been a saving of €107,372, 82 if the 181 LTP carried out in the Hospital Geral Santo António in 1999 had been performed under the ambulatory regime. The current economic evaluation highlights the urgent need to develop effective AS programmes in Portuguese public hospitals, especially at a time when National Health Service costs in Portugal are steadily rising.

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### 1. Introduction

The economic benefits linked to ambulatory surgery (AS) have unquestionably stimulated the incredible development it has witnessed since the 1970s in the United States and in many European countries, in the 1980s and '90s [1–4]. Indeed, even though the many important advantages implicit in AS are widely cited in the scientific literature [5–13], it is still the economic aspects that are attracting significant attention today, particularly as health costs are reaching dizzyingly high levels in many societies.

Most economic studies in this area point to lower hospital costs for AS, which range between 40 and 80% of the amount spent for the same operation under an inpatient regime [1–4]. These undeniable and consensual conclusions mostly came from North America in the 1980s, removing controversy from the issue to the extent that nowadays the topic is no longer studied.

Portugal has only recently woken up to ambulatory practice (in 1999 it accounted for only 5.5% of all operations [14]), and there are no reliable economic indicators to allow such a conclusion to be drawn as that noted in terms of the magnitude of the saving (although it would seem obvious that the North American results could be extrapolated to other countries, including that of Portugal). We have sought to assess the relative costs for the same operation (laparoscopic tubal ligation (LTL)) performed by the same surgical team, but under two different regimes: ambulatory (A) versus inpatient

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(I). We have also established the difference between the two models and compared the respective costs with the funding [15] proposed by the Institute for Informatics and Financial Health Management (Instituto de Gestão Informática e Financeira da Saúde (IGIFS)) for these operations.

## 2. Material and methods

This comparative analysis of the two alternatives and the respective cost assessment was carried out between 1 January and 19 April 2000. Approval was given by the Hospital Geral Santo António (HGSA) Ethics Committee, and the administrative bodies and technical management of the HGSA Departments involved, directly or indirectly, agreed to collaborate with the study.

Information was gathered in the HGSA, from the ambulatory surgery unit (ASU) for the outpatient operations and from the theatre room (TR) for the inpatient operations. The Office for Economic Studies in the HGSA was responsible for collecting the data, with the help of physicians and nursing staff.

The size of the sample for each group was based on 10% of the annual number of LTL procedures predicted for the year 2000 for the HGSA UCA, in a patient group completely free of any pathology (defined as ASA I by the American Society of Anaesthesiologists), aged between 25 and 45. This was calculated to be approximately 120 patients.

Twenty-four ASA I patients proposed for LTL were included. All were candidates for inclusion in an AS programme. They were divided into two groups of 12 patients according to the surgical regime under which they would be operated: GROUP A (AS) versus GROUP I (inpatient surgery). The surgical team was the same for the two groups. All the patients were given a balanced general anaesthetic by different anaesthetic teams.

Relative costs were determined by assessing surgery times, which were defined by the period measured from the time anaesthesia started to the time when the theatre was ready to start the next case.

Only the direct costs related to the operation which the IGIFS used as the basis for its calculation of the diseases related groups (DRG) prices for AS (Table 1) were assessed. Costs related to pre-operative preparation (consultations, diagnostic tests, etc.) and to patient follow-up have not been included in our results since they do not form part of the DRG calculation. None of the indirect or intangible costs have been included as they are outside the scope of this study. The calculated values were compared with those established by the IGIFS for the above-mentioned DRG: DRG no. 362—Ligation of Fallopian tubes, via endoscopy, for the sums

Table 1  
Criteria laid down by the IGIFS to calculate the DRG value for AS

Cost of 'theatre room' and 'post-anesthetic recovery unit'
Cost of 'ward'
Cost of 'medical staff'
Cost of 'nursing' and 'catering/accommodation'
Cost of 'administration' and 'ancillary staff'
Cost of 'clinical consumables'
Cost of 'CDTR' (complementary diagnosis and treatment resources)
Cost of 'medicines'

of €648.44 and 918.79, for ambulatory and inpatient surgery, respectively [15].

Anaesthetic and surgical techniques were performed in the same way in the two regimes. It should be noted that there is no scrub nurse for this type of procedure in the UCA, and so the nursing staff involved in the ambulatory regime only numbered two, while in the TR there were always three nurses in attendance.

With respect to the statistical analysis, a significance level of 0.05 was adopted. The Mann–Whitney test was used for comparison of the average surgery times.

## 3. Results

Table 2 gives the average surgery times recorded. The extremely significant difference found between the two values is stressed. The speed with which LTL was performed in the UCA in comparison with those carried out in the TR is striking, even though the same surgical team was responsible for both procedures in the two surgical environments.

None of the operations was attended by any major complication; all the GROUP A patients were discharged on the day of surgery, at around 7.00 p.m.; none of these patients had to be admitted or re-admitted within the 30 days following surgery.

Table 3 shows the costs of the operation for the two groups. Four kinds of direct costs are detailed (those incurred by undertaking the operations in question): staff; medicines; clinical consumables, and other materials (contracts, depreciation, other consumables, etc.). Note that there is an important difference in the staff costs (lower in GROUP A), thanks to the smaller number of nurses and quicker execution of the operation in this group. The biggest costs in terms of medicines in GROUP A was due to the use of more

Table 2  
Average surgery time

	GROUP A	GROUP I	Mann–Whitney test
Average surgery time (min)	26.75 (20–34)	45.42 (35–65)	$P < 0.01$

Table 3  
Cost of operations in the theatre (in euros per operation)

	GROUP A (€)	GROUP I (€)	Relative saving (I – A/I)
Staff costs	27.10	63.75	
Medicines	60.70	55.46	
Clinical consumables	28.90	31.74	
Other costs	39.00	59.09	
Total	155.70	210.04	25.9%

expensive analgesics (especially non-steroid anti-inflammatories, as opposed to the opioids, more used in GROUP I), but this is easily justified by the need for an effective multimodal analgesic plan, which has no side effects that could compromise discharge at the end of the day, as envisaged for these patients. The savings made exclusively at the level of surgical costs was 25.9%.

Table 4 gives the total costs (cost of surgery plus those incurred by hospital stay). The average hospital stay for GROUP I patients was 2.8 days. This figure was greatly influenced by a hospital stay of 7 days for one patient whose first booking for theatre time had to be postponed for 4 days because of lack of surgery time. The difference in costs of hospital stay thus registered a difference of €538.88; in other words, each operation in GROUP A represented an average saving of 72.7%. Attention is further drawn to the fact that the average daily value in 2000 of the HGSA Hospital Day Unit (phase II recovery area for day surgery patients, before discharge home) adopted for this study has been to some extent over-estimated. This multi-purpose unit treats, besides post-operative surgical patients, oncology patients that represent more than 50% of the total costs of this unit.

The final cost obtained makes it possible to calculate an average saving of €593.22 for each of the LTL operations in the sample in the HGSA UCA, which is an average saving of 62.4%.

Table 5 gives the financial outcome that the HGSA eventually obtained for the patients in this study. With respect to the surgical procedures included in this study, the HGSA earned an average of €290.62 per LTL performed under the ambulatory regime, and spent

Table 5  
Average financial outcome for operations carried out (LTL), for the HGSA (in euros)

	GROUP A (€)	GROUP I (€)
DRG funding (A)	648.44	918.79
Total average cost (B)	357.82	951.04
Difference (A) – (B)	290.62	–32.25

€32.25 for each LTL performed under the inpatient regime.

#### 4. Discussion

The first point concerns the average operating times achieved. Indeed, it is often said that smaller units, like the HGSA's UCA, are more efficient and productive. This effect not only has indirect implications in the lower costs that accompany it: it could also play a crucial role in cutting down waiting lists for operations [5,6]. In a country that has earnestly debated this issue, the implementation of AS programmes could well be the obvious way to combat the causes of the problem through greater productive capacity in the National Health Service (NHS). This difference, which our study has helped to identify, will be the more relevant the greater the complexity and size of a TR in comparison with an AS programme in a Separate/Autonomous Unit, as is the case of the structures in question in the HGSA. This situation would probably be less relevant in situations where the AS programme functions in an Integrated Unit within a small scale hospital institution

Table 4  
Total costs—theatre and hospital stay (in euros per operation)

	GROUP A (€)	GROUP I (€)	Relative saving (I – A/I)
Theatre costs	155.70	210.04	
Hospital stay (average—days)	202.12 (1.0)	741.00 (2.8)	
Total	357.82	951.04	62.4%

(TR with a maximum of three or four operating rooms, for instance).

Second, the fact that the surgical team in GROUP A did not include a scrub nurse (as is normal in most surgical teams) should be stressed. In fact, the lack of an scrub nurse in GROUP A, though open to discussion, follows several examples in other ASUs throughout the world. This situation cannot be repeated for certain surgical procedures (laparoscopic cholecystectomy, unilateral lobectomy of the thyroid, lumbar discectomy, among others). Furthermore, it lies in the context of scarcity of nursing staff and of an appreciable number of residents for the various surgical specialties, factors which have led the HGSA's UCA to adopt that structure for this type of operation.

Third, the difference in the costs of surgery does not seem to be too important when compared with the difference in costs for the hospital stay. It is true that the average hospital stay of 2.8 days for the GROUP I patients greatly influenced this (when the average in the price lists regulated by the IGIFS in Order no. 348-B/98 is only 2.1 days [15]). But it is equally true that in our institutions quite a few patients have their operations delayed through lack of surgery time, which results in high economic and other costs for the hospital, the patient, the NHS and the community in general. As mentioned earlier, the cost of the hospital stay ascribed to the GROUP A patients was overestimated owing to factors relative to the less than ideal organization in which the HGSA AS programme finds itself. Actually, the significance in terms of economic cost of the oncology patients who share the Day Hospital Unit facilities with the surgical patients is quite obvious, and cannot be underestimated. Bearing these two factors in mind, then, it is fair to consider that, if these factors were not involved, the difference in costs would probably remain the same, but their value would be lower, for the two groups.

Finally, in addition to the clearly greater efficiency and corresponding surgical productivity, not to mention the highly significant economic 'savings' (62.4%) that AS yields, we should further bear in mind that, by replacing inpatient operations with AS operations (a partial replacement of provision, depending on the type of surgery), the institution is enabled to use these facilities for other patients who need them, or it may even be possible, in the future, to close some surgical beds in our hospitals.

Extrapolating these findings to a large-scale AS programme in a general hospital like the HGSA, or to a national programme, would have a huge economic impact, and so this study should be considered carefully by everyone concerned with the management of national organizations linked to Health and Public Hospitals. As an example: if all the 181 LTL performed in the HGSA had been performed under an ambulatory regime, the

HGSA would have saved €107,373.78. If the 1726 LTL carried out in Portugal in 1998 [16] had all been performed under the ambulatory regime, the national saving for this type of operation would have been €1,023,906.91. This situation is clearly utopian, as it is impossible to say that all these patients could have been operated on under an ambulatory regime. In the USA, in 1994, a mere 94.4% of patients underwent LTL operations under an ambulatory regime [16]! It should be remembered that only one type of procedure has been studied. Imagine the economic and social impact if this situation were extrapolated to other kinds of surgery. We believe that AS cannot today be supported virtually. It should be supported in an actual, pragmatic way, or else expressions such as 'economic rationality' and 'value-based care' (which Orkin [17] defines as being 'the best clinical outcome for a reasonable price') will cease to have any meaning for us.

## 5. Conclusions

In the HGSA, this study has led to the conclusion that an LTL carried out under an ambulatory regime costs 62.4% less in relation to the same operation when performed on an inpatient basis. In addition to other important advantages, such as those of a clinical and social nature (less incidence of hospital-acquired infections and post-operative complications; enhanced humanization, less disruption of the normal socio-family environment, and quicker resumption of socio-professional life), there seems to be no question as to the considerable economic benefits to be gained from developing AS programmes. These are greater technical efficiency (expressed in the utilization and combination of less expensive resources to achieve a desired outcome of the same or better quality), and greater economic efficiency, expressed in economic and social benefits for users, families and the community.

This study, which does not include similar approaches in the HGSA and in other hospitals, clearly shows the pressing need to develop effective, efficient AS programmes in the various hospitals in our NHS.

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