ELSEVIER

J. of Ambulatory Surgery 10 (2003) 109–112

Ambulatory Surgery

www.elsevier.com/locate/ambsur

Correlation between the evolution of the substitution index and anaesthetic quality indicators in a day surgery programme

M.A. Martín López [a,*], G. Ollé Fortuny [a], Ll. Opisso Juliá [a], F. Oferil Riera [a], L.A. Hidalgo Grau [b], M. Prats Maeso [b]

[a] *Department of Anaesthetics, Cta de Cirera s/n, 08304 Mataró (Barcelona), Spain*
[b] *Department of General Surgery, Hospital de Mataró, 08304 Mataró (Barcelona), Spain*

Received 1 November 2002; accepted 22 February 2003

Abstract

Aim of the study: To evaluate the correlation between the substitution index, anaesthetic risk of the patients and anaesthetic quality indicators in our day surgery unit (DSU). *Patients and method*: From 1994 to 2001, 15 359 patients were operated on in our DSU. The substitution index per year and for every surgical procedure was calculated. The rate of patients with ASA risk of 2 or more was also calculated. Early admissions (patients not discharged from the DSU) and late admissions (patients previously discharged from the DSU) are considered as quality indicators. Statistical analysis was done by SPSS-Windows program (8.0 version) for the Pearson's correlation index for qualitative data. *Results*: The substitution index per year increased from 21.7% in 1994 to 53.10% in 2001. There was also an increase in the rate of patients with ASA risk of 2 or more (12.3% in 1994 and 56.12% in 2001). However, the rate of both early and late admissions was stable in the period of time considered, around 1.6%. In the statistical analysis, there was a linear correlation between the substitution index and the number of patients with ASA risk of 2 or more, but there was no correlation between the substitution index and the evolution of anaesthetic quality indicators. *Conclusions*: The increase in the substitution index and in anaesthetic risk do not worsen the rates of anaesthetic quality indicators considered.

Keywords: One day surgery; Anaesthetic quality indicators; Substitution index

1. Introduction

The substitution index in major ambulatory surgery has been increasing in Spain since programmes of this surgical modality began in the early 90s of the last century. In fact, major ambulatory surgical procedures done reaches at this moment a substitution index of around 60% in hospitals with fully developed day surgery units (DSU) [1,2]. Good results obtained in ambulatory patients allowed including in the programmes those with low to moderate anaesthetic risk and practising more complex surgical procedures [3].

Early and late admissions of the patients have been considered as quality indicators related to the anaesthetic procedures themselves [4]. The ASA classification adds the concept of anaesthetic risk for every patient.

The aim of the study is to evaluate the correlation between the substitution index, anaesthetic risk of the patients and anaesthetic quality indicators in our DSU.

2. Material and methods

From 1994 to 2001, 15 359 patients were operated on in our DSU. The following parameters were considered and calculated for the present study:

- Number of patients operated on every year in the DSU.

* Corresponding author. Tel.: +34-937-417-700; fax: +34-937-417-743.
E-mail address: 14024mml@comb.es (M.A.M. López).

0966-6532/03/$ - see front matter
doi:10.1016/S0966-6532(03)00005-2

- Percentage of patients operated on every year in the DSU with ASA risk of 2 or more.
- Substitution index per year (number of patients operated on in the DSU/number of patients operated on in the Hospital).
- Substitution index per year for every surgical procedure (number of patients operated on in the DSU for a procedure/ number of patients operated on in the Hospital for the same procedure).
- Percentage of patients with anaesthetic events in a year, which had resulted in early and late admissions. We considered as early admissions the patients not discharged from the DSU that required in-hospital stay, and late admissions the patients discharged home from the DSU and then admitted.

Statistical analysis was done by SPSS-Windows program (8.0 version). Results of the parameters considered are expressed in percentages and statistical comparisons were done by the Pearson's correlation index for qualitative data.

3. Results

Table 1 shows the results obtained after calculation of the rates corresponding to the parameters considered. They are expressed as absolute values and percentages. During the period studied, 15 359 patients were operated on in the DSU, with a linear increase over the years. The percentage of patients with ASA risk of 2 or more also increased (from 12% in 1994 to 56% in 2001). Since 2000, the more prevalent surgical procedures in the DSU (tonsillectomy, pilonidal cysts, knee arthroscopies, breast nodes and cataracts) reached a substitution index over 70%. Other surgical procedures like haemorrhoidectomies and varicose veins stripping were added to DSU activity from 1999.

Table 2 shows the overall rate of postoperative anaesthetic events and the specific incidence of the more frequent complaints of the patients, including pain, arterial hypotension, nausea and vomiting, headache and urinary retention. Overall rates of early and late admissions had a mean value of 1.6%, with a range between 0.8 and 2.9%.

The analysis of correlation (R) of the substitution index in a year and percentages of patients with ASA risk over 2 are shown in Fig. 1. There is a positive linear correlation ($R = 0.9$) between both parameters with a progressive increase of the substitution index and the percentage of patients with ASA risk of 2 or more.

There is no correlation between the substitution index and the percentage of anaesthetic events ($R = 0.01$), what is shown in Fig. 2. Note that there is a lineal and progressive increase of the substitution index, while the rates of anaesthetic events were stabilized.

4. Discussion

The results of the study confirm that it is possible to increase the surgical activity in the DSU including patients with higher anaesthetic risk, without impairment of the anaesthetic quality indicators considered.

The increase of the rate of patients with ASA risk of 2 or more reflects a rise in anaesthetic complexity in the DSU. In that sense, the implementation of new clinical guides for insulin-dependent diabetic patients and patients on treatment with oral anticoagulants have allowed us to include them progressively among the group of DSU patients. The development of systematic and easier schedules for treatment produced by our colleagues (endocrinologists and haematologists) have been essential for this progress.

The substitution index has not only increased due to the inclusion of more complex anaesthetic patients in the DSU, but new surgical procedures have been done in the

Table 1
Evolution of substitution index in the period studied

Years	1994	1995	1996	1997	1998	1999	2000	2001
Patients operated	390	1202	1639	1816	1963	2197	2977	3175
Patients with ASA risk ≥ 2(%)	12.3	18.1	24.5	28.1	33.3	33.6	49.2	56.1
Substitution index (%)	21.7	26.7	36.5	37.4	39.4	42.4	50.2	53.1
Substitution index (%) for								
Tonsillectomy	0	19.3	61.5	68.5	77	82.3	92.1	92.5
Pilonidal Cyst	19.7	66.2	70.9	83.7	70.9	83.7	85.6	76.1
Knee arthroscopy	3	31.7	49.5	63.6	62.9	70.8	76.7	85.1
Breast node	33.8	42.4	47.9	63.9	61.1	70.8	74.4	62.7
Cataracts	10.8	34.3	56.1	43.3	46.9	56.3	71.9	76.3
Haemorrhoids	–	–	–	–	–	–	46.2	85.2
Varicose veins stripping	–	–	–	–	–	42.4	49.3	52.4
Anaesthetic events (%)	0.8	1.7	2.9	1.7	1.6	1.2	1.1	0.8

Table 2
Postoperative anaesthetic events

Years	1994	1995	1996	1997	1998	1999	2000	2001
Anaesthetic events	0.8	1.7	2.9	1.7	1.6	1.2	1.1	0.81
Pain	0.3	0.0	0.1	0.1	0.1	0.3	0.01	0.2
Nausea and vomiting	0.3	0.8	0.7	0.4	0.2	0.1	0.1	0.2
Headache	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Urinary retention	0.0	0.0	0.4	0.2	0.1	0.0	0.0	0.1
Arterial hypotension	0.3	0.1	0.3	0.1	0.1	0.1	0.1	0.1

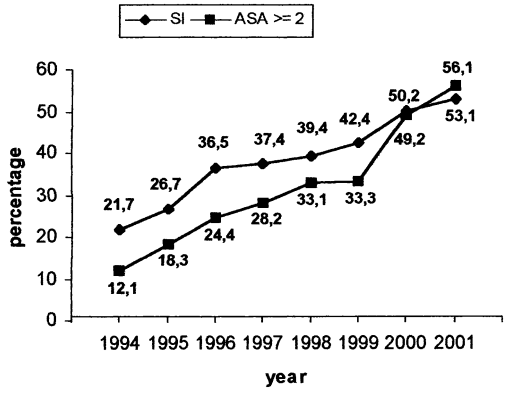

Fig. 1. Correlation between the substitution index (SI) and postoperative anaesthetic events expressed in percentage.

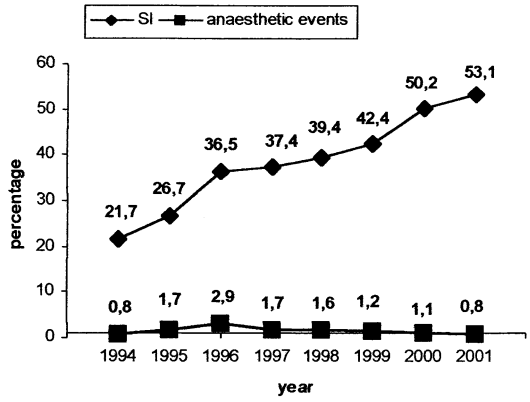

Fig. 2. Correlation between the substitution index (SI) and patient with ASA risk ≥ 2 expressed in percentage.

DSU too. We had not considered haemorrhoidectomies for DSU before 1999 (except very selected cases) because of the pain and postoperative comfort. This initial exclusion was reconsidered because of the development of new postoperative analgesic schedules and changes in surgical technique [5].

Anaesthetic, surgical, administrative and social causes of admission are classically considered in the literature [6]. The index of early and late admissions is one of the more accepted quality indicators in the DSU, but it has been studied only by a few groups of authors. Ramón et al. have published a rate of 1.4% in a series of 1310 patients, including both late and early admissions. Rivera et al. [7] reached a rate of 1.8% with a substitution index of 63.2%. A more extensive study by Fortier et al. [8] over a group of 15 172 patients had a percentage of admissions of 1.4%.

In our experience, the most frequent anaesthetic events that cause admission are nausea and vomiting, headache, pain and urinary retention. A study and knowledge of all them is essential for prevention. In our series, nausea and vomiting, and postoperative pain have a markedly high incidence. Both the inclusion of antiemetic drugs [9] and an improvement in the treatment of postoperative pain [10,11] could be a promising way to reduce the rates in the future [12].

It is important to point out that our study shows a correlation between the increase of substitution index and the rate of patients with ASA risk of 2 or more, but the incidence of anaesthetic causes of admission have remained stable.

In conclusion, in spite of the increase in surgical and anaesthetic complexity, and the overall DSU activity, the anaesthetic indicators of quality have not worsened. This has been achieved by refining anaesthetic techniques and the use of new drugs.

References

[1] Fernandez Torres B, García Ortega C, Marquez Espinós C, Fontán Atalaya I. Caracterización de la cirugía mayor ambulatoria en un hospital general. Rev Esp Salud Públ 1999;73(1):71–80.
[2] Ramón C, Pelegrí D, Turón E, Linares MJ, Burriel J, Fernandez M, Herraiz M, Sierra E. Criterios de selección utilizados en 1310 pacientes en cirugía mayor ambulatoria. Rev Esp Anestesiol Reanim 1993;40(4):234–7.
[3] Wilmore DW, Kehlet H. Management of patients in fast track surgery. Br Med J 2001;322(7284):473–6.
[4] Kangas T, Ohukainen J, Koivuranta M. Patients' experiences of day surgery. — An approach to quality control. Amb Surg 1999;7:31–4.
[5] Longo A. Treatment of hemorrhoids disease by reduction of mucosa and hemorrhoidal prolapse with a circular suturing device: a new procedure. Proceedings of the 6th World Congress on Endoscopic Surgery. Rome, Italy, June 3–6, 1998.
[6] Jimenez A, Arribas MD, Murillo C, Abenia JM, Elía M, Gonzalez M. Analysis of complications and causes of unexpected hospitalitation in ambulatory surgery. Amb Surg 1999;4:163–7.

[7] Rivera C, Gómez-Arnau JI, García del Valle S, Plaza A, Santa Ursula JA, Burgos E. Análisis de los ingresos hospitalarios no programados en un programa de cirugía mayor ambulatoria integrada. Cir May Amb 2000;5(4):186–9.
[8] Fortier J, Chung F, Su J. Unanticipated admission after ambulatory surgery. A prospective study. Can J Anesth 1998;45:612–9.
[9] Tang J, Wang B, White PF, Watcha MF, Qi J, Wender RH. Effect of timing of ondansetron administration on its efficacy, cost-effectiveness, and cost-benefit as a prophylatic antiemetic in the ambulatory setting. Anesth Analg 1998;86:274–82.
[10] Rawal N. Analgesia for day-case surgery. Br J Anesth 2001;87(1):73–87.
[11] Girish P Joshi. Review article. Pain management after ambulatory surgery. Amb Surg 1999;7:3–12.
[12] Morales R, Esteve N, Casas I. Why are ambulatory surgical patients admitted to hospital? Amb Surg 2002;9:191–5.