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Day surgery: where do our efforts need to be focused? Results of a review and simulation on administrative data

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Abstract

Study objective: First, to appraise the utilisation of day surgery in an advanced Italian region. Second, to identify which surgical procedures, among those rarely performed in day surgery, can be effectively performed without ordinary hospitalisation. *Design*: Retrospective analysis of hospital discharge records related to all the 683,615 surgical interventions performed in Lombardy in 1998. Review of the last 10 years literature supporting or undermining the practicability of day surgery for the 262 procedures that, although performed at least once in day surgery, overall rarely performed in such a way. *Main results*: While as many as 1189 procedures out of 2140 (56%) were performed at least once in day surgery, the overall percentage of surgical interventions performed in this regimen was only 15.6%. The review of the literature yielded 41 procedures regarded as effectively performable in day surgery. We calculated that an absolute increment of day surgery of 20% in only these procedures would produce an increment of 5% in the overall prevalence of day surgery. *Conclusion*: Health policies aimed at reducing the length of hospitalisation after surgery can be effective even by focusing on a tiny set of procedures. Analysis of administrative data could provide useful steering hints for policy makers.

Keywords: Ambulatory surgical procedures; Day care; Health planning; Hospitalisation

1. Introduction

For many procedures, day surgery is an effective and efficient approach, offering several advantages to patient, staff, hospital and society [1–3]. The introduction of new surgical and anaesthetic techniques, the advances in medical and nursing skills, together with increased patient expectations towards healthcare assistance all contribute to a rapid enlargement of the indications and the demand for day surgery [2,4,5]. Significantly, the United Kingdom Royal College of Surgeons claimed in 1992, that 50% of all surgical procedures are practicable in such a regimen [6].

Notwithstanding, day surgery is not yet a common practice in Italy [7] or in many other developed countries [8,9]. Indeed, several factors could reduce the implementation of day surgery in practice. It has been recognised that organisational factors play a crucial role in facilitating or limiting day surgery [10,11]. Other variables have been also identified in which patients' clinical conditions [12], anaesthetist and surgeon skill [13–15], patients' preferences [3,16], quality of care outside the hospital [17] and, obviously, the specific type of procedure involved [17].

To date, the impact of the type of procedure in conditioning the use of the day surgery has been little investigated. Nevertheless, in 1997 the National Agency for Regional Health Services, part of the Italian Ministry of Health, published a list of 384 surgical procedures, classified with ICD-9-CM coding, regarded as feasible with shortened hospitalisation. Procedures were also stratified into those possible on an ambulatory basis and those requiring day surgery [7]. Since then, that list has become the reference point for most guidelines intended for local implementation.

With the aim of investigating the use of day surgery, we reviewed the administrative hospital discharge records produced in 1998 in Lombardy, one of the largest Italian regions. Procedures rarely performed in day surgery were further in-

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vestigated by reviewing evidence supporting their feasibility in day surgery.

2. Methods

All the 1998 hospital discharge records of the Lombardy region reporting a surgical procedure (coded with the ICD-9-CM classification) were studied.

Each procedure executed at least once in day surgery was classified following two criteria: the proportion performed in day surgery and its numerical relevance with respect to the whole amount of surgical interventions performed in the region during 1998. Within the first criterion we set up three classes of procedures: (1) those performed in day surgery in less than 5% of cases; (2) those performed in day surgery in 5–30% of cases; (3) those performed in day surgery in more than 30% of cases. Three classes were also derived from the second criterion: (A) procedures performed less than once every 10,000 interventions; (B) procedures performed between once every 200 interventions and once every 10,000 interventions; (C) procedures performed at least once every 200 interventions. The two cut offs applied roughly correspond to procedures carried out once every 5 days and to those carried out 10 times a day. Analysing these two classifications, nine clusters of procedures were obtained (Table 1).

We then reviewed the relevant literature of the past 10 years supporting or undermining the practicability of day surgery for procedures belonging to clusters B1, C1 and C2. This because they covered most of the interventions carried out and, consequently, an evidence based implementation of day surgery for those procedures would more efficiently increase the overall proportion of day surgery. In order to make a bibliographic search of MEDLINE feasible, we collapsed the list of candidate procedures through two distinct steps. First, we took advantage of the hierarchical structure of the ICD-9-CM classification, where the first three digits of the code refers to a group of procedures, and the fourth digit represents the single procedure in its full detail. We used the three-digit code when all its four-digit subsets were present in our list. For example, the codes 53.00 (“unilateral repair of inguinal hernia, not otherwise specified—inguinal herniorrhaphy NOS”), 53.01 (“repair of direct inguinal hernia”), 53.02 (“repair of indirect inguinal hernia”), 53.03 (“repair of direct inguinal hernia with graft or prosthesis”), 53.04 (“repair of indirect inguinal hernia with graft or prosthesis”), and 53.05 (“repair of inguinal hernia with graft or prosthesis, not otherwise specified”) were replaced by the code 53.0 (“unilateral repair of inguinal hernia”). Second, we collapsed procedures that were judged very similar from a surgical perspective. For instance, “tonsillectomy” and “adenoidectomy” were considered together, as “tonsillectomy/adenoidectomy”. For each of the obtained groups of procedures remaining in the collapsed list, relevant articles were detected by crossing the keywords “day care” or “ambulatory surgical procedures” (all sub-headings) with those identifying the specific procedure under investigation.

Whenever available, pertinent articles were retrieved. Those that were not, or written in any language other than English or Italian, had at least their English original abstract considered. Each procedure was classified according to two independent attributes: the definitive judgement about its feasibility in day surgery, summarised from the authors’ conclusions, and the quality of the studies in support of that judgement. Table 2 shows the adopted classification levels, with their definitions.

Finally, we simulated the effect on the overall proportion of procedures performed in day surgery, as it could be eventually demonstrated by any increment in the performance of procedures belonging to clusters B1, C1 and C2 (see Table 1) and whose execution with shortened hospitalisation was seemingly supported by good or satisfactory evidence (see Table 2 for definitions).

3. Results

A total of 683,615 surgical interventions made up of 2140 different procedures was performed in 1998 in Lombardy. On an average, 106,430 interventions (15.6%) were performed in day surgery, while 1189 procedures out of 2140 (56%) were performed at least once in day surgery. These 1189 procedures, corresponding to 607,424 interventions, did encompass all 384 being reported in the National Agency’s list [7] (see Section 1). Table 3 shows the distribu-

Table 1
Classification of surgical procedures according to their performance

	Proportion a procedure has been performed in DS		
	1: ≤5%	2: 5–30%	3: ≥30%
Numerical relevance of the procedure			
A: Performed less than once every 10,000 interventions	A1: Uncommon procedures, rarely performed in DS	A2: Uncommon procedures, infrequently performed in DS	A3: Uncommon procedures, repeatedly performed in DS
B: Performed between once every 200 and once every 10,000 interventions	B1: Quite common procedures, rarely performed in DS	B2: Quite common procedures, infrequently performed in DS	B3: Quite common procedures, repeatedly performed in DS
C: Performed at least once every 200 interventions	C1: Common procedures, rarely performed in DS	C2: Common procedures, infrequently performed in DS	C3: Common procedures, repeatedly performed in DS

Table 2
Classification applied to the reviewed evidence

Classification axes	Classification levels	Classification criteria
Judgement on the feasibility in DS		
	Feasibility in DS supported by the literature	Favourable results on clinical outcomes, such as safety
	Feasibility in DS seemingly supported by the literature	Favourable results, but tempered by the complexity of the procedure or evaluated with non clinical end-points (e.g., costs)
	Feasibility in DS hardly supported by the literature	The results suggest DS only in specialised centres, due to the complexity of the procedure
Quality of evidence supporting the judgement on the feasibility in DS		
	Good	Comparative studies or several concordant non comparative studies
	Satisfactory	Few concordant large scale non comparative studies
	Poor	Few concordant small scale non comparative studies
	Unsatisfactory	No studies or discordant results

Table 3
Distribution of the surgical procedures according to their relevance and performance in day surgery

	Proportion a procedure has been performed in DS		
	1: ≤5%	2: 5–30%	3: ≥30%
Numerical relevance of the procedure			
A: Performed less than once every 10,000 interventions	A1: 84	A2: 369	A3: 171
B: Performed between once every 200 and once every 10,000 interventions	B1: 230	B2: 182	B3: 113
C: Performed at least once every 200 interventions	C1: 23	C2: 9	C3: 8

tion of the 1189 procedures when classified according to the criteria described in Table 1. Globally, classes B1, C1 and C2 covered 443,448 interventions, 15,407 of which (3.5%) were performed in day surgery. After the aggregation was applied to procedures belonging to these classes (see Section 2), the original 262 procedures were grouped into 128 different categories of procedures, six in the class B1, 11 in the class C1, and 111 in the class C2.

A search for relevant publications on these procedures led us to review 348 papers written in 158 different journals. The result of this analysis is reported in Table 4. The 24 groups of procedures belonging to the first two rows and the first two columns of Table 4 (i.e. procedures appearing to be supported by the literature as feasible in day surgery) did correspond to 41 single procedures in the original list (see Appendix A). We then figured out the possible increment in the overall proportion of day surgery by simulating increased proportions of day surgery for these 41 procedures. Fig. 1 shows this relationship being approximately linear. For instance, one might calculate a 5% grow in the overall prevalence of day surgery, given an absolute increment of 20% of day surgery for those selected procedures. This would correspond to 34,000 interventions additionally performed in day surgery per year.

4. Discussion

The role of day surgery is becoming increasingly important world-wide. It potentially offers, through an adequate selection of patients and a specific organisation, health care as effective as the traditional approach, at a lower cost [18–21]. Its potential advantages extend over the shortening of the waiting list and the delivery of better care, as an increased number of beds and personnel would be shifted toward patients with more serious pathologies [11].

With the aim of studying the practice of day surgery, we reviewed the 1998 administrative database of all the hospitalisations occurred in Lombardy, a northern Italian Region inhabited by more than nine million people. Remarkably,

Table 4
Distribution of the surgical procedures according to the review of the literature

	Quality of evidence				
	Good	Satisfactory	Poor	Unsatisfactory	Total
Judgement on the feasibility in DS					
Supported	12	6	0	0	18
Seemingly supported	5	1	8	9	23
Hardly supported	0	0	1	0	1
No clue of criticism	0	0	0	86	86
Total	17	7	9	95	128

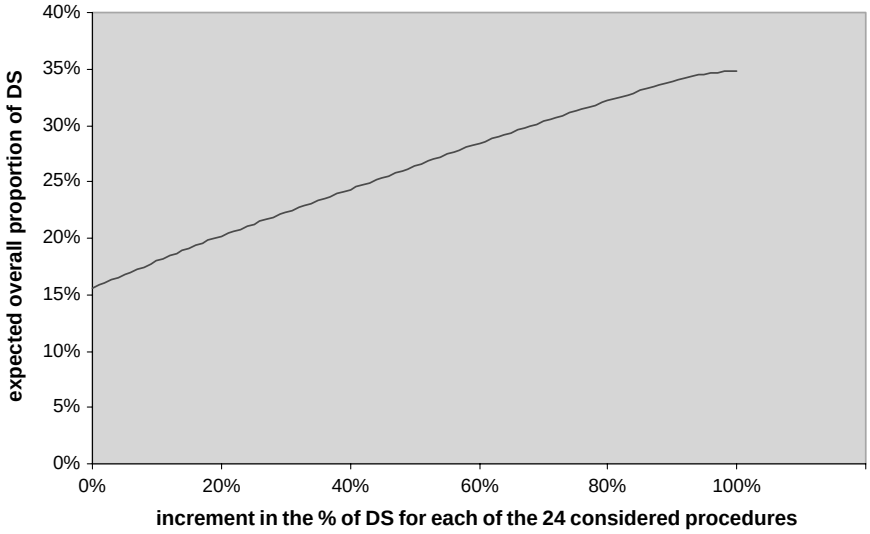

Fig. 1. Relationship between the increment in the proportion of day surgery for the 41 selected procedures and the increment in the overall proportion of day surgery.

the simple information about the hospitalisation regimen of each single procedure revealed interesting phenomena.

The first raw data that provides food for thought is the average use of day surgery (only 15.6% of all interventions were performed in day surgery). This situation, which appears inadequate when compared with other countries (e.g. 87% in Canada [22]; more than 50% in Australia [23]), might be regarded as a cultural heritage. Until 1995, Italian public hospitals were funded on a retrospective basis, so that for many years cost containment problems were largely undetected. Hence, arguments to implement less expensive alternative assistance, such as day surgery, were few and seemingly unmotivated.

We classified each procedure according to both the number of times it was performed in day surgery and its numerical relevance. By crossing the two classifications, 683,615 interventions emerged as prevalently distributed among the classes B1, C1 and C2 (Table 1), covering almost 65% of all the executed interventions. Since they also correspond to procedures rarely (B1 and C1) or quite rarely (C2) performed in day surgery, they seem particularly interesting in the attempt to increase the overall prevalence of day surgery. Because of that, we reviewed the relevant literature concerning these procedures, and we found that 32% (41 out of 128) were judged feasible in day surgery. We then calculated that an investment able to enhance the use of day surgery for these procedures could have a profound and directly proportional impact on the overall prevalence of day surgery.

Furthermore, our work showed how the analysis of administrative data could serve at least three different purposes.

First, to evaluate general and local situations. In the present analysis we found a particularly low use of day surgery in one of the most advanced Italian regions, which is likely to represent an optimistic picture for the whole country. Moreover, these data would easily allow the identification of those departments performing day surgery at a very high or very low rate.

Second, to establish priorities for investments. Only 41 procedures were found to deserve special attention. These are procedures rarely performed in day surgery in the region, although they are clearly supported in the literature as feasible without ordinary hospitalisation. It is remarkable that for as many as 67% of the reviewed groups of procedures (86 out of 128) we did not find studies on their practicability in day surgery. This could be due to at least three reasons: (1) for many procedures it is superfluous to document the day surgery feasibility, and no one undertook this task; (2) we termed each procedure as in the ICD-9-CM classification, and this could have affected the sensitivity of our search; (3) only the MEDLINE database was considered, thus some specialised journals, like “ambulatory surgery”, were excluded. However, although the procedures of interest could be more than 41, we showed how their promotion in day surgery could have a tremendous impact on the overall situation.

Third, the analysis of administrative data could be helpful in steering and monitoring the plans for enhancing the use of day surgery at a macro (geographic area), meso (hospital), and micro (department) level.

In summary, while there is wide consensus that any policy aimed at the implementation of day surgery should provide funds for both structural and organisational reforms of surgical departments, a strategy focused on the promotion of day surgery for some particular procedures could produce not only a knock-on effect on other procedures, but a direct and significant impact on the overall number of procedures performed in day surgery.

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Appendix A

List of 41 procedures whose feasibility in DS appeared to be supported by the literature.

ICD-9-CM Code	Description
13.2	Extracapsular extraction of lens by linear extraction technique
13.64	Discission of secondary membrane (after cataract)
13.65	Excision of secondary membrane (after cataract) capsulectomy
13.66	Mechanical fragmentation of secondary membrane (after cataract)
13.69	Other cataract extraction
28.0	Incision and drainage of tonsil and peritonsillar structures
28.3	Tonsillectomy with adenoidectomy
38.5	Ligation and stripping of varicose veins
38.8	Other surgical occlusion of vessels
40.5	Radical excision of other lymph nodes
49.44	Destruction of hemorrhoids by cryotherapy
49.45	Ligation of hemorrhoids
49.46	Excision of hemorrhoids
49.47	Evacuation of thrombosed hemorrhoids
49.49	Other procedures on hemorrhoids
53.0	Unilateral repair of inguinal hernia
53.1	Bilateral repair of inguinal hernia
53.2	Unilateral repair of femoral hernia
53.4	Repair of umbilical hernia
54.0	Incision of abdominal wall
54.5	Lysis of peritoneal adhesions
63.1	Excision of varicocele and hydrocele of spermatic cord
68.21	Division of endometrial synechiae
68.22	Incision or excision of congenital septum of uterus
68.29	Other excision or destruction of lesion of uterus
68.3	Subtotal abdominal hysterectomy
68.6	Radical abdominal hysterectomy
69.0	Dilation and curettage of uterus
80.1	Other arthrotomy
80.2	Arthroscopy
81.4	Other repair of joint of lower extremity
81.80	Total shoulder replacement
81.81	Partial shoulder replacement
81.82	Repair of recurrent dislocation of shoulder
81.84	Total elbow replacement
81.93	Suture of capsule or ligament of upper extremity
81.94	Suture of capsule or ligament of ankle and foot
81.95	Suture of capsule or ligament of other lower extremity
81.96	Other repair of joint
81.97	Revision of joint replacement of upper extremity
81.99	Other operations on joint structures NOS

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