

# Reimbursement systems, organisational forms and patient selection: Evidence from day surgery in Norway

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## Abstract

*Background:* Cream-skimming in the health care sector is a phenomenon that has attracted considerable attention in recent years. Cream-skimming can be defined as the selective treatment of patients that demand little resources while providing high economic refunds. It has been widely assumed that the activity-based financing (ABF) system introduced in Norway in 1997 together with the 2002 hospital reform would increase the incentives for cream-skimming, but so far little empirical evidence exists to support such a proposition. *Method:* The ABF system offers the same economic reimbursement for patients classified within day-surgical DRGs irrespective of whether the patient actually receives same-day treatment or inpatient care over several days, and the potential for cream-skimming is consequently high within these diagnoses. Using patient data from the 1999-2004-period, the analysis investigates the relationship between patient severity – indicated by length of stay – and waiting time within the largest day-surgical DRGs, controlling for age and gender of the patient, treatment in private hospital, as well as institutional and dynamic variation. The model is estimated by regression analysis. *Results:* The analysis gives some evidence of patient selection, although the picture is far from clear-cut: out of 24 procedures analysed, waiting time increased with patient severity in 11 cases, and decreased in 7. There are however strong variations with regards to the practical effects of patient severity. *Conclusion:* Whereas our paper focuses solely on economic motivation as an explanation for patient selection, this is probably only part of the picture. Our results should therefore be interpreted with some caution. Only by taking into account important aspects related to hospital capacity and organisation, and the use of personnel and equipment, can we obtain a satisfactorily understanding of how patients are selected for day-surgical treatment.

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## **1. Introduction**

Cream-skimming in the health care sector is a phenomenon that has attracted considerable attention in recent years. In short, cream-skimming can be defined as the selective treatment of patients that demand little resources while providing high economic refunds. Cream-skimming may take on different forms, such as hospitals choosing healthier patients from their waiting lists, patients being re-classified to maximise income, or patients being selected for treatment on different set of criteria (Culyer, 1993). This kind of behaviour is usually assumed to prove a more significant problem in market-oriented health systems (Le Grand, 1991). Given that recent health reforms in many Western countries have introduced market-based hospital financing schemes (e.g. Newhouse, 1994), there is consequently a growing interest in exploring the potential for protection against cream-skimming, while at the same time preserving incentives to efficiency.

Adapting to the increasing market-orientation in Western welfare systems, Norway introduced an activity based financing (ABF) scheme for the hospitals in 1997. A second major reform was introduced in 2002 as the central government took over responsibility and ownership of all public hospitals from the counties, and turned them into trusts (see e.g. Hagen and Kaarbøe, forthcoming). So far few empirical studies have addressed the problem of cream-skimming. The study of cream-skimming is mainly rooted in the economic literature, and builds on a theoretical rather than an empirical approach, with the main ambition being the development of financing systems that reduces the scope for such behaviour (e.g. Matsaganis & Glennerster, 1993; Jones & Cullis, 1996; Ellis, 1999; Barros, 2003). The approach of the present paper is somewhat different, as our ambition is to explore the actual patient prioritisation of Norwegian hospitals in the wake of the new financing system and the 2002 hospital reform.

We concentrate on day surgery. Day surgery has gained increasing significance in Norway, as elsewhere in industrialised countries, during the last decade. Norwegian public health policy objectives explicitly state an aim to move towards outpatient and

same-day surgical services<sup>1</sup>, and this mode of treatment now constitutes more than 60 per cent of all elective surgery. The main arguments for substituting inpatient care with day surgery are well known: it is assumed to be less traumatising for the patient, involves lighter narcosis than in the case of traditional surgery, and implies shorter treatment time and faster convalescence. The underlying assumption is therefore that this mode of delivering surgery will ultimately increase the efficiency of hospitals as well as the quality of the patient treatment. Whereas the studies of day surgery have addressed aspects such as patient satisfaction (Roberts et al., 1995; Kangas-Saarela et al., 1998; Mitchell, 1999; Lau et al., 2000), clinical outcomes (Pineault et al., 1985), cost efficiency (Russel et al., 1977; Pineault et al., 1985; Ancona-Berk & Chalmers, 1986; Keithley et al., 1989; Heath et al., 1990; Hollmann et al., 1994; Janeke, 1994; Clarke, 1996; Weale, 2002), hospital efficiency (Martinussen & Midttun, 2004) and waiting time (Midttun & Martinussen, 2005), little attention has been paid to patient priorities.

Using patient data from 1999-2004, the main focus of our study is on the relationship between patient severity and waiting time for day surgery. Do hospitals give priority to patients that can be treated and discharged at the same day over patients that need in-patient care over several days? Simply put, if a hospital can choose between patients that provide the same economic reimbursement, is it then more likely that low severity patients will be chosen for treatment before high severity patients? Given that length of stay can be considered a proxy on the severity of the patient's medical condition and thereby on the resource use associated with the hospital stay, the central question to be addressed is whether the waiting time for treatment within the same day-surgical diagnosis related groups (DRGs) is shorter for patients with short length of stays than for patients with long length of stays. The day-surgical DRGs are of particular interest in our setting, since the ABF system offers the same economic reimbursement for patients classified within day-surgical DRGs irrespective of whether the patient is actually treated by day surgery or in-patient care. The potential for cream-skimming should consequently be especially high within these DRGs, since the hospitals will have an incentive for prioritising patients that imply the shortest

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<sup>1</sup> See for instance Governmental White Paper no. 24 (1995-1996).

possibly length of stay. Naturally, the waiting time for treatment is dependent upon other factors than patient severity alone, and our empirical analysis therefore controls for the age and gender of the patient, the year of treatment, and the hospital the patient received treatment in.

The paper is organised as follows. The next section gives a brief introduction to the theoretical concept in question; the problem of patient selection. For a better understanding of this paper it is also helpful to outline the main characteristics of the Norwegian hospital financing system, which is also done in this section. Section 3 describes the development of day surgery in Norwegian health care and presents the most common day-surgical DRGs. Section 4 develops the empirical model for the analysis. The empirical results are reported in section 6, while section 7 contains the concluding remarks.

## **2. The problem of patient selection**

Selection problems like cream-skimming is often related to competitive health insurance markets, where competing insurers receive a risk-adjusted premium-replacing payment per insured patient. Risk-adjustment can be defined as the adjustment of premiums paid to health plans or providers based on a formula that employs individual level information as the case mix element of the DRG system and/or demographic information as is often used in capitation based systems (Barros, 2003). The essence of the problem, as Newhouse (1998) puts it, is that a physician treating a patient will have more information about the patient's likely future spending than any risk-adjustment formula can incorporate. In such a context cream-skimming can be viewed as a form of preferred risk-selection, as the insurer select so-called preferred risks, i.e. those for whom the insurer considers risk-adjustment per capita payment to be above the expected cost level. Cream-skimming may thus occur if insurers are able to distinguish several subgroups of individuals with different expected costs within a risk group for which the risk-adjusted per capita payment is the same (de Ven & van Vliet, 1992).

An important point, noted by Pauly (1984), is however that cream-skimming is the result of *regulation* and not of *competition*. If insurers are free to set their premiums in a competitive market, the result would be premium differentiation rather than cream-

skimming. The problem is that premium differentiation in a free market is bound to imply that for instance an 80-year old person have to pay a much higher premium than a 20-year old, and that a chronically sick person would have to pay many times the premium of a chronically well person of the same age. According to Pauly, risk-adjusted per capita payments (or vouchers) can therefore be seen as “a form of regulation that attempts to simulate the premium structure in a competitive health insurance market without having the adverse effect of (extreme) premium differentiation” (Pauly, 1984: 24). Hence, cream-skimming is likely to occur when the system of risk-adjusted premium-replacing payments is not sufficiently sophisticated.

What then, are the adverse effects of cream-skimming? De Ven and van Vliet (1992) points out that the problems with such behaviour is three-fold. First, they note that the access to good health care for the (chronically) sick will be hindered. Insurers will try to attract the preferred risks and deter the non-preferred risks, and if the capitation system does not adequately compensate for health status, insurers will avoid providers with a good reputation of treating patients with for instance cancer, diabetes or high blood pressure, since the insurers want to avoid the patients that are attracted by these providers. Another possible outcome is higher premiums for the poorer risks, if insurers are allowed to increase their revenues by asking an additional premium from their insureds. Secondly, in the cases of insufficiently sophisticated payment systems, inefficient insurers who are successful cream-skimmers might drive efficient insurers out of the market. Investments in cream-skimming might thus have higher returns than investments in improving efficiency in the insurer’s organisation or in health care provision. Thirdly, de Ven and van Vliet emphasise that while individual insurers may gain from cream-skimming, they only shift the costs to others. There is therefore no social gain associated with cream-skimming. On the contrary, the costs of cream-skimming imply that there are only social welfare losses. In sum, cream-skimming can thus be considered counterproductive with respect to three supposedly positive effects of competition; i.e. improving the quality and efficiency of care and becoming more responsive to consumers’ preferences (de Ven & van Vliet, 1992).

At hospital level similar mechanisms prevail. The reimbursement incentives in a hospital financing system will influence the intensity of services and who is treated when patients differ in severity of illness (Ellis, 1998). Patients with more severe

medical conditions are typically more cost-driving in the sense that they demand more intensive treatment. If the hospital payment system does not fully compensate for such cost variations, patient selection may be the consequence. It is usually separated between two kinds of hospital financing systems; prospective and retrospective financing. Retrospective financing is the type of traditional 'cost-based' reimbursement that was dominant in most countries with private health care systems until the early 1980s. In such a system the hospitals' reported treatment costs are refunded by a third party. In a prospective payment system on the other hand, the hospitals either receives a lump sum dependent of the demography and needs in the hospital's catchment area, a fixed payment for each patient dependent upon a diagnosis related classification system, or a combination of these two systems. In a theoretical investigation of the implications of different payment incentives, Ellis (1998) compares cost-based reimbursement, prospective payment and a mixed payment system. Ellis' examination focuses on hospitals that compete for patients with the same diagnoses, but who vary in levels of severity of illness and hence need for health services. His conclusion that prospective payment may result in undesirable creaming, skimping and dumping is not merely a theoretical possibility, it is also one that has been found empirically to occur: real world examples of such behaviour includes Newhouse and Byrne (1988), Newhouse (1989) and Frank and Lave (1989).

The Norwegian reimbursement system prior to 1997 – implying that every hospital received a global budget by the beginning of the year – can be characterised as a prospective payment system, and thus provided incentives for cream-skimming. However, the reimbursement system was combined with strong prioritising signals, both from central government and from county politicians, which were compatible with basic medical ethics: patient severity should be the main prioritising rule. It is generally believed that this rule was followed. Yet, as a result of relatively low growth in the budgets in this period the system also produced long waiting lists and waiting time for elective treatment. The introduction of ABF increased production and efficiency (e.g. Biørn et al., 2003) and reduced waiting lists and waiting time. But did it also lead to cream-skimming? Initially, 30-50 per cent of the grant was given in accordance to the activity performance and patient mix. The ABF share was then gradually increased to 60 per cent of the total budget in 2003. Basic economics would not predict any changes in rules of prioritising by going from one to another

prospective payment system. Still, the question is whether the introduction of a way of economic thinking in one area (that revenues increase with increased production) will infuse the thinking in other area (that net revenues will increase as less severe patients are treated). Understood in this manner, hospital preferences are endogenised. Revenues will thus enter the hospitals' utility function as the reimbursement system changes.

The implementation of the ABF system in Norway implied that a proportion of the block grant from central government was replaced by a matching grant depending upon the number and composition of hospital treatments. This partial replacement of the block grant necessitated that the hospital activities were made more visible than before to secure patient reimbursements. Reflecting these new challenges for the hospitals, a survey conducted in 1999 on the consequences of the ABF system showed that 10 per cent of the chief surgeons in somatic hospitals had experienced pressure or instructions from the hospital management to give preference to profitable patients (Halvorsen, 1999). Also, in 10 per cent of the polyclinics the respondents held the opinion that the choice as to whether patient treatment was to take place via hospitalisation, day treatment or in polyclinics was guided by revenue generation rather than medical evaluations. Moreover, 25 per cent of the chief surgeons considered operations and treatment to be de-prioritised due to dependency of polyclinic income.

Similarly, the change of ownership and organisational form from governmental bodies to trusts in 2002 may also change the rules of prioritisations, as trusts are believed to be more revenue-oriented than governmental bodies. Consequently, even if central government has emphasised that prioritisations should be grounded in medical ethics rather than on the basis of economic evaluations, there has been a growing concern – indicated for instance in several articles in the Journal of the Norwegian Medical Association – that the latter may still become the case in the wake of the trust reform. As Haug (2001) notes, given that the reform shifts power from politicians, patients and health professions to enterprises and economists in the new hospital trusts, it is all the more important how these actors think and prioritise. Similarly, Øgar (2001) points out that the new trusts are strongly orientated towards principles of business management, with income and the fulfilment of economic

responsibilities strongly related to the production of profitable services. Øgar therefore find it difficult to see how the less profitable – but health-politically prioritised – services and activities are to be attended within the new system. Ultimately, he notes, if the principles of business management are to guide hospital activities and services, we may risk that the healthiest patients will be given even higher priority at the expense of the least healthy patients.

As already noted, the day-surgical activity of the hospitals is a useful starting point for an investigation of the extent of patient selection in Norway. Given that the hospitals receive no additional refunds for day surgery patients that need to be hospitalised for treatment, a situation exists where it is possible to distinguish between subgroups of patients with different expected costs for which the hospital financing system does not fully compensate. Hence, a hospital that is successful in selecting day surgery patients that can be treated and discharged at the same day thus face lower costs than a hospital that have a large share of day surgery patients that need inpatient care. In the next section we present the day-surgical activity in Norway in closer detail.

### **3. Day surgery in Norwegian healthcare**

In order to study day surgery empirically, two important aspects need to be clarified. We need to consider first whether day surgery should be assumed to be elective (i.e. planned), and, secondly, whether inpatient admissions with 0 days length of stay should be defined as day surgery. Building on the common approach of several other Norwegian studies (Huseby, 2002; 2004; Martinussen, 2005; Martinussen & Midttun, 2004; Midttun & Martinussen, 2005), day surgery is in the following defined rather widely, including all surgical treatment with 0 days length of stay, independent of whether the patient is admitted to an inpatient ward or day treatment ward, and independent of whether the operation is planned or not. Given such a definition, day surgery now constitutes almost 50 per cent of all surgery in Norway, and 61 per cent of all elective surgery. Day surgery was not included in the ABF system until 1999, and is therefore not registered for earlier years, but during the 6-year-period for which

data exists the number of day-surgical procedures has increased by nearly 52 per cent and more than 65.000 stays.<sup>2</sup>

- Figure 1 -

A first impression of the relationship between patient severity and waiting time for elective day surgery can be obtained by comparing the waiting time for short stays (length of stay = 0 days) and long stays (length of stay  $\geq$  1 day). This is done in figure 2, and the figure obviously lends little support to a hypothesis that more severe patients waited longer than less severe patients.<sup>3</sup> Even if waiting time for short stays dropped during the period, the waiting time decreased more than the double for long stays; with 97 days for the latter patients and 44 days for the former patients. Notice however the significant drop in short-stay waiting time from 2002 – the year of the hospital reform – to 2004, during which waiting time was reduced by 30 days.

- Figure 2 -

However, treating all day-surgical activity as one naturally implies a vast oversimplification. Given that day surgery in 2004 comprised 153 different DRGs involving a large number of various procedures, a more suitable approach is instead to focus on the specific day-surgical DRGs. In table 1 the day-surgical activity is therefore broken down into the day-surgical DRGs with the largest patient volumes during the 1999-2004-period. Only the DRGs with a patient volume equal to at least 1 per cent of the total volume, and that did not change definition during the period, is shown. As can be seen, eye operations, abortions, and light orthopaedic procedures constitute the largest share of the day-surgical DRGs. Lens operations (DRG 39) is by far the most common type of treatment, accounting for 12 per cent of the day-surgical activity and almost 137 000 stays during the whole period. Yet, there has been an overall decrease in this kind of operations throughout the period, from 13.3 per cent in 1999 to 9.6 per cent in 2004. The abortions' share of day surgery is about the half of

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<sup>2</sup> Until 1999, an arrangement with a separate tariff system for day surgery existed. This was a central incitement to encourage the use of day surgery, as day surgical procedures triggered a special state financed reimbursement on top of the block grant.

that of lens operations during the period, with 6 per cent and almost 69 000 stays. The third most common procedure is knee operations, accounting for 4.3 per cent and nearly 50 000 stays. Note also the strong increase in this type of treatment, from only 1 603 stays in 1999 to 11 432 stays in 2004. The main reason is that this DRG received as many as 7 500 stays from arthroscopy in 2002, which is reflected in the corresponding decrease in the latter procedures from that year. Of the remaining DRGs, only arthroscopy and extraocular procedures etc. operations accounted for more than 3 per cent of all day surgery during the period. The general decrease in DRG-shares is simply due to the fact that there was a steady increase in the number of day-surgical DRGs during the period.

- Table 1 -

Figure 3 then presents the actual share of same-day treatments performed within each of the day-surgical DRGs reported in table 1. The table serves as a good illustration on why day surgery deserves special attention in the context of patient selection: within several of the DRGs there is a surprisingly low share of patients that were actually treated by day surgery, while other DRGs again have an almost 100 per cent day surgery rate. In fact, the percentage same-day treatment is below 50 per cent for almost one third of the DRGs presented in figure 3, and for DRGs 112, 311, 337, 356 and 494 the share of same-day treatment is even below 20 per cent. At the other end of the scale we find DRGs 6, 39, 40, 62 and 381, with more than 90 per cent same-day treatments. The large variation between the DRGs in terms of the actual use of day surgery is naturally related to how complicated the procedures are.

- Figure 3 -

Figure 3 thus reflects the considerable potential for patient selection that exists for day-surgical treatment. In order to minimise costs the hospitals have an incentive to give preference to patients that can actually undergo day-surgical treatment, or to patients that at least have as short length of stay as possible, since the hospitals are

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<sup>3</sup> Admissions with waiting time more than 999 days are omitted, since cases of longer waiting times have proved to have a high degree of unreliable waiting time registrations due to administrative errors, lack of updating of the lists and so forth (Dahlen et al., 2002).

only refunded for same-day treatments. However, the prospect for making this kind of patient selection is naturally higher the larger and more heterogeneous the patient group. Hence, for the DRGs with near 100 per cent day surgery, there exists little room for prioritising between patients based on assumed length of stay, since almost all patients are treated and discharged the same day. As it is difficult to decide exactly where to set the limit for which DRGs should be investigated, and in order to obtain as a complete picture as possible, we therefore choose to include *too many* DRGs rather than *too few*. In the following empirical analysis we consequently include all day-surgical DRGs with a share of same-day treatment of less than 90 per cent, even if the cases with near 90 per cent same-day treatment naturally implies little variation in our central explanatory variable; length of stay. In the analysis the following DRGs from table 1 are thus excluded: 6, 39, 40, 62 and 381.

#### **4. Empirical model**

In this section we elaborate a simple empirical model to test the hypothesis that presumably high severity patients have longer waiting times than presumably low severity patients. Although patient severity is the variable of main interest in our study, a number of additional factors can naturally be expected to influence the time a patient has to wait before admission to hospital, and consequently need to be controlled for in the analysis. Our model captures both patient-specific and hospital-specific aspects, as well as the dynamic dimension (for a more detailed description of the variables in the analysis, see the appendix).

Starting with the central explanatory variable, *patient severity* is operationalised as the patient's length of stay. The underlying assumption is that hospitals in most cases hold relatively detailed information about a patient's condition, obtained either through medical deliberations from the patient's primary physician, through polyclinical consultations at the hospital, or both. When organising the waiting list, the hospital will therefore have a pretty good estimate on most patients' length of stays, and thereby on the costs and resources that can be expected to be related to each case. The hospitals then have an incentive to select the patients that can be assumed to have the shortest length of stay, thereby reducing the costs. Hence, our main hypothesis is that length of stay is positively related to waiting time; that is, that the most complicated patients had to wait the longest for treatment.

Another important patient-specific determinant of waiting time is assumed to be the *age* of the patient. The expectation is that long waiting times for elderly patients generally can be associated with increased risks for complications and further health deteriorating effects. Moreover, elderly patients often have multiple diagnoses, which constitute an additional reason for prioritising elderly patients in lieu of younger ones. Also, former waiting list regulations explicitly pinpointed that when all other conditions were equal, elderly patients should be prioritised (Jørgensen & Kalseth, 1993). In a study of 452 patients referred to in-patient surgery at Akershus Central Hospital, Arnesen et al. (2002) thus found that patients above 70 years of age had the shortest waiting times. We therefore expect age to have a negative impact on waiting time.

A third patient characteristic incorporated in the model is the *gender* of the patient. Even if there is a fundamental Norwegian health political objective that everyone should have equal accessibility to health services (NOU, 1999a), we shall control whether gender bias leads to discrepancies in the waiting time for treatment. It is commonly assumed that women in general have longer waits than men, and that this can be explained firstly by differences in the extensiveness of various diagnoses, and secondly by an unequal prioritisation of these diagnoses in the disfavour of women. If that is the case, illnesses and diagnoses most typical for men will often be prioritised on the expense of ‘women’s diseases’. This anticipation has found support in a Norwegian study documenting that illnesses and medical specialities most typical for women have historically been validated lower with regard to prestige among medically trained personnel (Album, 1991). Furthermore, such an expectation is in accordance with the statements in a Norwegian white paper from the Ministry of Health and Social Affairs (NOU, 1999b), emphasising that medical research traditionally has been guided by a ‘male norm’. More importantly, several international studies have reported gender-specific waiting time variations within certain DRGs, with men systematically favoured (e.g Dong et al, 1998; Langham et al, 1997; Alter et al, 1999; Naylor & Levinton, 1993; Steingart et al, 1991; Petticrew et al, 1993; Kee et al, 1993). Consequently, a dummy variable with men as reference category is included in the analysis.

Waiting time is also assumed to be strongly related to whether the patient was treated in a *private hospital* or not. Given that the private hospitals operate under the principles of profit maximisation, and that their role is to handle the less complicated procedures for the public hospitals, the waiting time for treatment is consequently much shorter than in public hospitals.

Furthermore, to control for the strong variations in waiting time at the institutional level, the model also include *hospital-specific* dummy-variables. The Norwegian health care system consists of various types of hospitals, and it is usually separated between university clinics, central hospitals, county hospitals with central hospital wards, local hospitals, and county hospitals with reduced local hospital services (Huseby, 2002b). The range of specialities differs much between the hospitals, and the waiting time consequently varies. Although the most specialised hospitals in general have access to more resources than the other hospitals, they also have a more complex patient mix. This naturally occupies personnel and resources, which could otherwise have been used to treat a large number of patients, and thereby cutting back waiting lists. On the other hand, the largest hospitals will benefit from scale effects, and thereby have the most efficient activity and shorter waiting time for treatment.

A factor that complicates our analysis is the expansion of separate day surgical units during the period analysed. Obviously, an increase in day surgical units may stimulate treatments of less severe cases. Although investments in day surgical units can be understood as a mean to increase revenues – and could thereby well be stimulated by both the ABF and the trust reform – technological change should be seen as the main explanation of the growth of day surgical units. This complicating factor in the statistical analysis is partly handled by including the hospital-specific variables: by controlling for the hospital that the patient was treated in, we indirectly also manage to account for the variation in day surgery between hospitals.

Finally, to account for the *time-wise* variation during the six-year period analysed, year-specific dummy-variables also enter the model. As figure 2 documents, there has been a strong reduction in waiting time during the period. After the responsibility for providing specialised health services was transferred to central government in 2002, there has been a total reduction in average waiting time of more than 20 per cent, and

the waiting time for treatment in Norwegian hospitals has never been shorter. We can therefore expect waiting time to be negatively related to time. The inclusion of the year-specific dummy-variables also provide an additional, and more explicit, control for the strong increase in day surgery during the period of analysis,

Finally, to test for the impact of the 2002 hospital reform, we also estimate the model incorporating an interaction term for the length of stay-variable and a dummy variable for the 2002-2004-period. Given the many pessimistic assumptions that the trust reform would increase the risk of patient selection, the interaction term should in that case reflect such a development.

## **5. Empirical results**

Three sets of variables are included in our model. The first group represents the patient-specific characteristics: length of stay, the age and gender of the patient, and whether the patient was treated at a private hospital or not. The second group of variables adds a set of hospital-specific dummy-variables to the model, while the last set of variables account for the dynamic aspect by including year-specific dummy-variables. The analysis employs patient-data for the period from 1999 to 2004, and includes only day-surgical DRGs that a) represent a patient volume of at least 1 per cent of all day-surgical stays during the period, and b) day-surgical DRGs with less than 90 per cent same-day treatment share. By these criteria we are left with 24 DRGs available for analysis, including between 11 040 and 49 223 patients. The model is estimated via OLS regression, and the results are reported in table 2. All models were estimated with hospital-specific dummy-variables, but these estimates are not shown in the table.

- Table 2 -

Starting with the variable of main interest, the empirical results lend partial support to our hypothesis: even after controlling for age, gender, treatment in private hospital, and institutional and time-wise variation, waiting time for elective day surgery is still positively related to patient severity within a number of day-surgical DRGs. But the picture is not that clear-cut, as the results also indicate the opposite relationship within several DRGs. Yet, some kind of pattern emerges from the results: patient selection

mainly seems to take place within the light orthopaedic procedures (arthroscopy, excisions/removals of internal devices, and operations on knee, shoulder/elbow/forearm, foot, soft tissue and hand/wrist), while prioritisation according to severity on the other hand tends to be associated with feminine procedures (uterine procedures, dilation and curettage/conization).

Concentrating first on the DRGs for which we do find tendencies of patient selection, these account for 11 of the total of 24 procedures analysed, and also include rhinoplasty, tonsillectomy/adenoidectomy and varicotomy in addition to the light orthopaedic procedures. The estimates in table 2 express the number of days that the average patient had to wait for each extra day length of stay. Note however that the practical effects of length of stay on waiting time vary considerable between the DRGs; from 1.6 to 16.3 days. Hence, for some of the DRGs it is discussable what practical relevance the estimated extra waiting time associated with length of stay actually has. In fact, some might argue that any effect less than at least a week may seem rather unsubstantial at first, but that would be jumping to conclusions. For instance, the estimated effect of length of stay on waiting time for local excision and removal of internal devices (DRG 231) is only around 2.5 days, but considering that length of stay varies between 0 and 125 days, the impact becomes clearer: for instance, assuming a standard deviation change in length of stay of 3.2 days, a patient would stand to wait more than 8 days longer for treatment (when the other independent variables are held constant) – which could be quite much in cases of painful illnesses.

For the DRGs with waiting time negatively related to patient severity it is similarly worth noticing that we for several cases obtain effects that are of questionable relevance in practical terms. However, for retinal procedures (DRG 36), other skin, subcut tissue and breast procedures (DRG 270), transurethral procedures (DRG 311) and laparoscopic cholecystectomy (DRG 494) the magnitude of the length of stay-effect is quite substantial. The most likely explanation is that these are procedures for which extra waiting time may increase the risk of complications, and that these patients consequently are given higher priority.

Turning to the control variables, we expected the age of the patient to be negatively related to waiting time. This holds true only in 12 cases though, with the practical impact ranging from 0.8 days shorter waiting time per extra year of age in the case of soft tissue procedures (DRG 229) to 7.5 days shorter waiting time for skin/subcut tissue/breast procedures (DRG 270). It is especially worth noticing that the negative relationship between age and waiting time holds for many of the light orthopaedic procedures. On the other hand, and contrary to our assumptions, waiting time actually *increased* with age in as many as 9 cases. Hence, even if elderly patients often have multiple diagnoses, and thereby have higher risks for complications and health deteriorating effects, they still experienced longer waits for many procedures. This may simply be due to the fact that their treatment occupies more hospital resources in terms of personnel and equipment than other patients, which may obviously spill into longer waiting. The practical impact of each extra year of age on waiting time lies in the interval from 0.72 days in the case of inguinal/femoral hernia procedures (DRG 162) to more than 19 days for tonsillectomy/adenoidectomy procedures (DRG 58).

The empirical results furthermore uncover relatively strong gender differences in waiting time, and, with a few exceptions, in favour of male patients: men waited shorter than women for treatment in as many as 10 of the DRGs analysed. The differences are most pronounced for foot procedures (DRG 225) and soft tissue procedures (DRG 227), constituting as much as 23 and 19 days, respectively. The advantage enjoyed by male patients is in fact above 11 days in 7 of the 10 DRGs where men are favoured. The opposite relationship only appears in 3 cases: male patients waited *longer* than female patients on rhinoplasty (DRG 56), hand/wrist procedures (DRG 229), and shoulder/elbow/forearm procedures (DRG 224), with the differences amounting to 4.7, 10.2 and 12.3 days, respectively.

As expected, patients receiving treatment at private hospitals experienced a far shorter waiting time than those treated at public hospitals. The only two exceptions from this trend are tonsillectomy/adenoidectomy procedures (DRG 58) and procedures on female reproductive systems (DRG 356), for which the negative relationships fail to reach statistical significance. The difference between public and private treatment is

quite substantial, ranging from 62 days for procedures related to dilation/curettage/conization/radio-implant (DRG 364) to 266 days for percutaneous cardiovascular procedures (DRG 112). In fact, the waiting time advantage enjoyed by patients in private hospitals exceeds 100 days in 14 of the 24 DRGs investigated.

The effects of the year-specific dummy-variables reflect the strong reductions in waiting time during the period of analysis. As can be observed, especially tonsillectomy/adenoidectomy for adults (DRG 59), operations on shoulder/elbow/forearm (DRG 224), and knee procedures (DRG 222) had a strong decrease, with waiting time being reduced with more than 90 days in 2004 compared to 1999.

Finally, we also estimated our model with an interaction-term for the length of stay-variable and a dummy variable for the 2002-2004-period included, so as to test whether the tendency of patient selection was more pronounced in the wake of the hospital reform. The results obtained when this variable enters the equation are reported in the second column for each of the DRGs. Obviously, an assumption that the trust reform should have increased the problem of patient selection receives only partial support. Only in the case of 6 DRGs do we find a stronger positive relationship between patient severity and waiting time in the period after 2002 than in the period before; these are rhinoplasty (DRG 56), tonsillectomy/adenoidectomy (DRGs 59 and 60), knee procedures (DRG 222), hand or wrist procedures (DRG 229), and uterine and adnexa procedures (DRG 359). The estimated effects lie in the interval between 1.8 and 7 days. On the other hand, the most severe patients waited significantly shorter in the post-reform period for treatment within as many as 10 DRGs. Of these, varicotomy (DRG 119) and arthroscopy (DRG 232) stands out, with reductions in waiting time of at least 10 days.

## **6. Conclusion**

Our ambition with this paper was to investigate empirically the patient priorities within the main day-surgical DRGs in Norway. Employing the problem of patient selection as our theoretical departure, the empirical analysis set out to test whether

waiting time for treatment is related to severity of illness. Our main argument is that the day-surgical DRGs deserves special attention in such a context, since hospitals in the ABF system are refunded the same for patients classified within day-surgical DRGs independently of whether they were actually treated by day surgery or inpatient care. The fact that the share of same-day treatment is relatively low in several day-surgical DRGs therefore commands the following question: do hospitals give priority to the patients that imply the shortest length of stay, since each day of in-patient care represent an additional cost that will not be reimbursed? Our empirical results certainly indicate that some form of patient selection occurs within several of the largest DRGs, mainly within the light orthopaedic procedures. This holds even when controlling for other important determinants of waiting time, such as the age and gender of the patient and being treated at a private hospital, as well as institutional and dynamic variation.

Yet, our results should be interpreted with some caution. First of all, the fact that the overall waiting time for day surgery has decreased not only for short stays, but also for long stays, implies that the observed waiting list adjustments not necessarily need to be in conflict with the basic principles of patient prioritisations. Secondly, whereas the present paper focuses solely on economic motivation as an explanation for patient selection, this is probably only part of the picture. Needless to say, the practical organisation of the day-surgical activity is far too complex to be modelled satisfactorily with the data at hand, and our analysis therefore probably fails to capture several important aspects that can influence a patient's waiting time for treatment. In general, it can be assumed that the more complicated a patient is, the more hospital resources are necessary in terms of personnel and equipment in order to perform the operation. This will especially be the case for patients with multiple diagnoses. It is consequently more challenging to organise and schedule treatment for such patients, which may in many cases lead to longer waiting time. The essential point however, is that this kind of waiting list adjustments would relate to capacity problems and organisational challenges rather than to economic motivations.

The increasing use of so-called ring fencing of elective surgery in Norwegian hospitals during the period of analysis may serve as a practical illustration of this aspect. Ring fencing refers to the practice where a whole department or unit is

secluded from the other activity taking place within the hospital (see e.g. Kjekshus & Hagen, 2004). So far, this organising principle has been most commonly applied for elective surgery, the main argument being that it may increase a hospital's efficiency through a reduced number of cancellations due to emergency admissions. In 1999, 17 per cent of Norwegian somatic hospitals had separate ring fenced departments, while this share increased by four percentage points to 21 per cent over the next two years. The activity in ring fenced units is organised according to the assembly line principle: "the patient arrives promptly at the top of the corridor and goes through the pre-operation room, operation, recovery, and then leaves at the end of the corridor with a pre-completed medical report in hand" (Hagen & Kjekshus, 2004: 58). The surgery is often highly specialised, with for instance only left-knee operations performed one particular day, and the next day only right-hip operations. As noted by Kjekshus and Hagen, the surgical team will thus be able to streamline production, with the operation theatre equipped only for those procedures to be handled on that specific day. The introduction of ring fencing in Norwegian healthcare must be seen in relation to the parallel increase in the use of day surgery during the same period, since the activity in ring fencing units most commonly will be day-surgical procedures. Empirical evidence from Norway suggests that the use of ring fencing may increase hospital efficiency (Kjekshus & Hagen, 2004) and that it reduces hospital waiting time (Midttun & Martinussen, 2005). The introduction of ring fencing could therefore serve as an additional explanation to the results presented here, since patients eligible for procedures performed in ring fenced units can expect to wait shorter than patients that are treated in ordinary units. But again, this kind of patient selection must be seen as a result of organisational matters rather than as an attempt to cream-skim patients to reduce hospital costs.

Given the intricate workings of the day-surgical activity, it is therefore evident that the data available today can only bring us part of the way to understand how patients are selected for treatment. A combination of more qualitative approaches and better data that would allow for the development of more sophisticated models incorporating important factors related to capacity, organisation, use of personnel and equipment, can help us grasp the full picture. But irrespective of whether it is the internal hospital organisation or the theory of cream-skimming that shed the most light on the problem of patient selection, the fact still remains: the most complicated patients had to wait

the longest for a number of day-surgical treatments. And it is probably safe to assume that for these patients it mattered little which factors actually could explain their extra waiting time.

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## Figures

Figure 1. Per cent day surgery of all elective surgery and all surgery, Norway, 1999-2004.

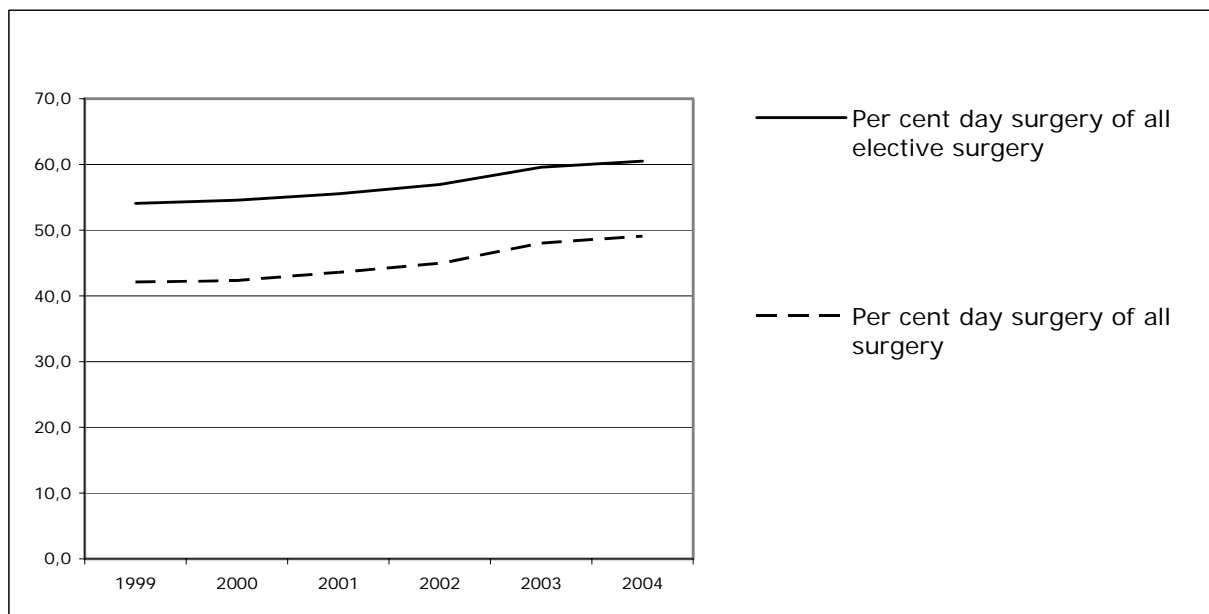


Figure 2. Waiting time and length of stay, Norway, 1999-2004.

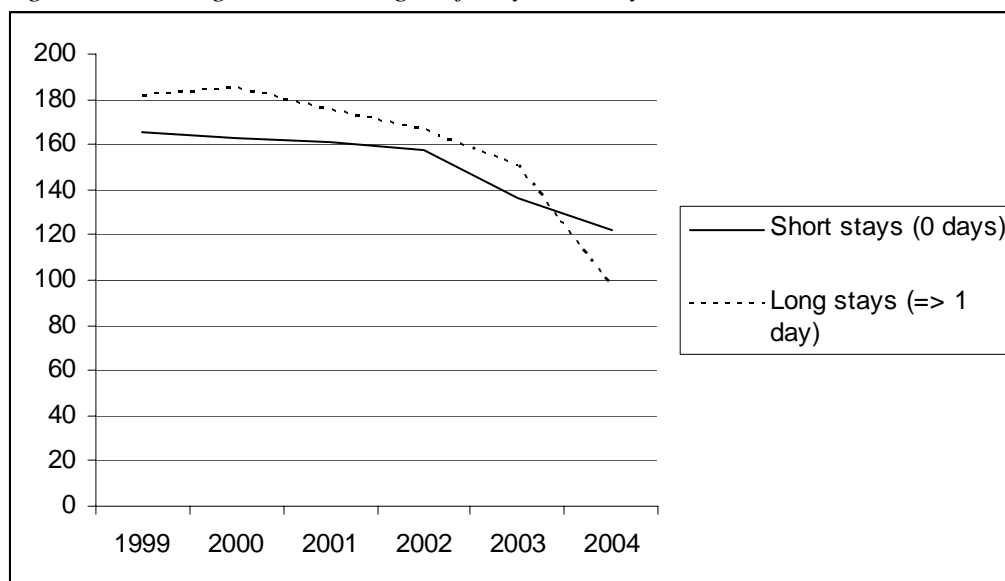


Figure 3. Per cent day surgery within specific day-surgical DRGs, Norway, 1999-2004.

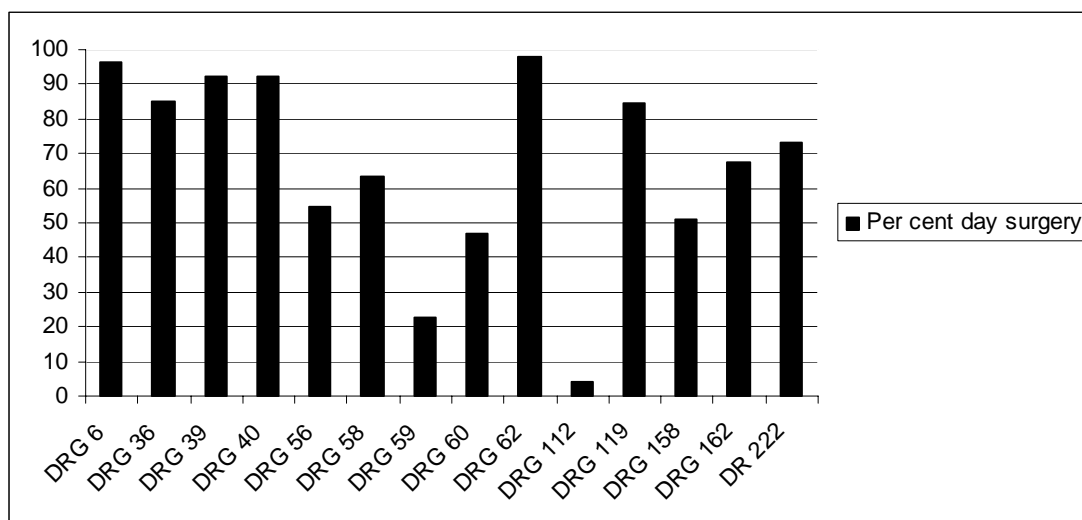
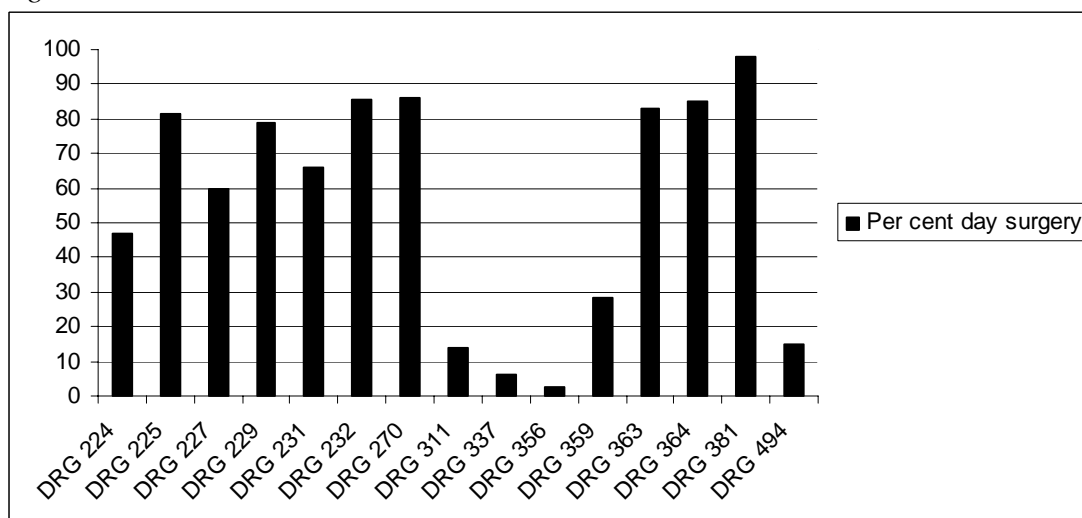


Figure 3 continued.



## Tables

*Table 1. Activity development for the most common day-surgical DRGs ( $\geq 1\%$  of total patient volume) in Norway, 1999-2004. Percentage of all day-surgical DRGs, with number of stays in parenthesis.*

DRG	1999	2000	2001	2002	2003	2004	1999-2004
6 Carpal tunnel release	2.0 (2 645)	2.1 (3 640)	2.2 (4 245)	2.3 (4 658)	2.4 (5 529)	1.9 (3 949)	2.2 (24 666)
36 Retinal procedures	1.8 (2 298)	2.1 (3 697)	2.2 (4 271)	2.4 (4 760)	2.1 (4 914)	2.0 (4 185)	2.1 (24 125)
39 Lens procedures w or w/o vitrectomy	13.3 (17 229)	14.5 (25 080)	12.5 (24 502)	11.5 (22 781)	11.4 (26 783)	9.6 (20 262)	12.0 (136 637)
40 Extraocular procedures exc orbit age > 17	3.0 (3 835)	3.4 (5 823)	3.3 (6 522)	3.6 (7 183)	3.3 (7 866)	3.0 (6 300)	3.3 (37 529)
56 Rhinoplasty	1.1 (1 421)	1.1 (1 930)	1.2 (2 310)	1.2 (2 457)	1.2 (2 905)	0.6 (1 261)	1.1 (12 284)
58 T&A proc, exc tonsillectomy and/or adenoid~ only, age 0-17	1.9 (2 438)	1.6 (2 747)	1.5 (2 893)	1.3 (2 555)	1.1 (2 665)	0.7 (1 446)	1.3 (14 744)
59 Tonsillectomy and/or adenoidectomy only, age > 17	1.6 (2 078)	1.6 (2 700)	1.5 (2 984)	1.3 (2 629)	1.1 (2 650)	0.9 (1 856)	1.3 (14 897)
60 Tonsillectomy and/or adenoidectomy only, age 0-17	4.2 (5 414)	3.6 (6 249)	2.9 (5 710)	2.7 (5 298)	2.3 (5 438)	1.9 (3 913)	2.8 (32 022)
62 Myringotomy w tube insertion age 0-17	2.4 (3 145)	2.0 (3 393)	1.7 (3 388)	1.4 (2 866)	1.4 (3 207)	1.2 (2 499)	1.6 (18 498)
112 Percutaneous cardiovascular procedures	1.5 (1 984)	1.4 (2 481)	1.9 (3 646)	2.2 (4 266)	2.3 (5 356)	3.0 (6 338)	2.1 (24 071)
119 Vein ligation & stripping	2.8 (3 556)	2.6 (4 418)	2.7 (5 382)	3.0 (5 981)	2.9 (6 802)	1.9 (4 011)	2.6 (30 150)
158 Minor intestinal procedures w/o cc	1.5 (1 923)	1.4 (2 426)	1.5 (2 845)	1.6 (3 112)	1.7 (3 919)	1.6 (3 388)	1.5 (17 613)
162 Inguinal & femoral hernia procedures, age > 17 w/o cc	2.8 (3 603)	2.3 (3 988)	2.3 (4 533)	2.3 (4 467)	2.1 (5 034)	1.7 (3 497)	2.2 (25 122)
222 Knee procedures w/o cc	1.2 (1 603)	2.0 (3 511)	2.2 (4 395)	6.5 (12 820)	6.6 (14 462)	5.4 (11 432)	4.3 (49 223)
224 Shoulder, elbow or forearm proc, exc major joint proc, w/o cc	1.6 (2 013)	1.6 (2 700)	1.7 (3 285)	1.9 (3 669)	1.9 (4 529)	2.5 (5 272)	1.9 (21 468)
225 Foot procedures	2.4 (3 071)	2.2 (3 855)	2.3 (4 538)	2.4 (4 699)	2.2 (5 203)	1.7 (3 531)	2.2 (24 897)
227 Soft tissue procedures w/o cc	1.8 (2 386)	1.7 (2 889)	1.7 (3 257)	1.8 (3 475)	1.9 (4 584)	2. (4 325)	1.8 (20 916)
229 Hand or wrist proc, exc maj joint proc w/o cc	2.8 (3 613)	2.6 (4 510)	2.5 (4 916)	2.6 (5 091)	2.5 (5 765)	2.3 (4 811)	2.5 (28 706)
231 Local excision & removal of int fix devices	1.4 (1 816)	1.5 (2 548)	1.5 (2 873)	1.6 (3 123)	1.4 (3 363)	1.7 (3 514)	1.5

except hip & femur							(17 237)
232 Arthroscopy	5.8 (7 497)	5.7 (9 869)	5.6 (11 028)	1.4 (2 693)	1.2 (2 825)	0.9 (1 980)	3.1 (35 892)
270 Other skin, subcut tissue and breast proc w/o cc	1.7 (2 145)	2.2 (3 730)	2.5 (4 945)	2.8 (5 550)	3.0 (6 964)	3.1 (6 648)	2.6 (29 982)
311 Transurethral procedures w/o cc	1.2 (1 561)	1.2 (2 006)	1.0 (2 034)	0.9 (1 839)	0.8 (1 827)	0.8 (1 773)	1.0 (11 040)
337 Transurethral prostatectomy w/o cc	1.4 (1 852)	1.3 (2 164)	1.1 (2 128)	0.9 (1 771)	0.8 (1 963)	0.8 (1 749)	1.0 (11 627)
356 Female reproductive sys reconstructive procedures	1.0 (1 233)	0.9 (1 513)	1.0 (1 936)	1.2 (2 344)	1.2 (2 775)	0.9 (1 991)	1.0 (11 792)
359 Uterine & adnexa proc for ovarian or adnexal non-malignancy w/o cc	3.6 (4 717)	3.3 (5 646)	3.4 (6 742)	3.3 (6 554)	2.9 (6 804)	2.7 (5 748)	3.2 (36 211)
363 D&C, conization and radio-implant, for malignancy	1.3 (1 661)	1.2 (2 078)	1.2 (2 266)	1.3 (2 622)	1.0 (2 460)	0.9 (1 945)	1.1 (13 032)
364 D&C, conization exc for malignancy	1.8 (2 380)	1.8 (3 068)	1.6 (3 208)	1.7 (3 432)	1.4 (3 275)	1.0 (2 037)	1.5 (17 400)
381 Abortion w d&c, aspiration curettage or hysterotomy	6.4 (8 241)	7.3 (12 604)	6.1 (12 045)	6.1 (12 033)	5.2 (12 340)	5.5 (11 612)	6.0 (68 875)
494 Laparoscopic cholecystectomy w/o CDE w/o cc	1.1 (1 467)	1.2 (2 045)	1.2 (2 368)	1.3 (2 491)	1.2 (2 920)	1.3 (2 720)	1.2 (14 011)

Table 2. Determinants of waiting time for elective day surgery, Norway, 1999-2004. Estimates obtained from OLS regression. Unstandardised estimates with standard errors in parenthesis.

	DRG 36		DRG 56		DRG 58		DRG 59	
Length of stay	-8.37** (.49)	-7.18** (.72)	16.28** (1.41)	13.00** (1.83)	4.22** (1.16)	2.83 (1.51)	.49 (1.02)	-.87 (1.16)
Age	-3.11** (.41)	-3.14** (.41)	-.29 (.67)	-.30 (.67)	19.21** (2.13)	19.30** (2.13)	2.70** (.70)	2.61** (.70)
Male	-2.71 (2.81)	-2.74 (2.81)	10.19* (4.26)	10.15* (4.26)	4.62 (2.69)	4.63 (2.69)	-5.82* (2.83)	-5.69* (2.83)
Private hospital	-	-	-209.91** (38.29)	-207.08** (38.29)	-65.67 (43.03)	-65.06** (43.03)	-112.27** (19.58)	-107.99** (19.65)
Year 2000	18.31** (5.87)	18.79** (5.87)	10.88 (7.00)	10.51 (7.00)	12.27** (4.59)	12.28** (4.59)	-6.16 (4.99)	-6.23 (4.99)
Year 2001	-7.74 (5.73)	-7.24** (5.73)	13.23* (6.73)	12.12 (6.74)	17.12** (4.51)	17.14** (4.51)	-16.06** (4.91)	-16.27** (4.91)
Year 2002	-4.29 (5.63)	-1.97 (5.72)	46.43** (6.65)	37.91** (7.30)	16.89** (4.63)	14.48** (4.93)	-35.64** (5.05)	-43.83** (6.03)
Year 2003	16.72** (5.59)	19.10** (5.69)	9.04 (6.64)	1.43 (7.16)	3.69 (4.63)	1.33 (4.92)	-49.76** (5.10)	-57.04** (5.88)
Year 2004	-9.14 (5.94)	-6.44 (6.06)	-50.21** (8.28)	-58.26** (8.75)	-23.86** (5.52)	-26.13** (5.75)	-108.43** (5.67)	-115.78** (6.39)
LOS* 2002-04		-2.06* (.92)		7.00** (2.48)		3.22 (2.24)		4.84* (1.95)
Intercept	164.30** (12.68)	163.22** (12.69)	193.93** (9.00)	198.08** (9.12)	32.95** (6.04)	33.53** (6.05)	147.55** (6.91)	150.57** (7.01)
Adj. R <sup>2</sup>	.06	.06	.15	.15	.07	.07	.15	.15
N	24 125	24 125	12 284	12 284	14 744	14 744	14 897	14 897

\*\* = p < .01, \* = p < .05

Table 2 continued.

	DRG 60		DRG 112		DRG 119		DRG 158	
Length of stay	1.61** (.45)	1.15* (.51)	.11 (.14)	5.25** (.84)	4.96** (1.15)	9.18** (1.43)	-.99 (.56)	.18 (.76)
Age	6.16** (.85)	6.15** (.85)	-5.57** (.26)	-5.64** (.26)	-1.15** (.41)	-1.09* (.43)	1.05* (.41)	1.03* (.41)
Male	1.95 (1.53)	.198 (1.53)	-11.84** (1.60)	-11.72** (1.60)	-18.01** (2.57)	-17.92** (2.57)	-12.69** (2.52)	-12.65** (2.52)
Private hospital	-69.64** (15.25)	-68.36** (15.26)	-265.94** (29.45)	-265.44** (29.43)	-208.96** (9.70)	-210.41** (9.70)	-171.08** (15.03)	-172.64** (15.04)
Year 2000	4.97* (2.53)	5.03* (2.53)	-28.76** (3.39)	-27.83** (3.93)	1.13 (4.29)	1.29 (4.29)	6.07 (5.12)	6.45 (5.13)
Year 2001	10.25** (2.59)	10.31** (2.59)	-25.79** (3.12)	-23.85** (3.14)	-9.16* (4.13)	-8.89* (4.12)	10.68* (4.98)	11.45* (4.99)
Year 2002	-5.31* (2.65)	-7.49** (2.87)	-33.70** (3.04)	-21.82** (3.58)	-6.19 (4.08)	-179 (4.17)	4.41 (4.92)	8.72 (5.27)
Year 2003	-13.93** (2.65)	-16.02** (2.86)	-30.03** (2.94)	-18.15** (3.51)	-54.92** (3.99)	-51.05** (4.06)	-17.53** (4.75)	-13.56** (5.06)
Year 2004	-39.97** (2.95)	-42.16** (3.16)	-56.81** (3.01)	-44.62* (3.59)	-86.64** (4.46)	-82.83** (4.52)	-57.39** (4.94)	-53.30** (5.26)
LOS* 2002-04		1.92* (.99)		-5.28** (.85)		-11.04** (2.22)		-2.47* (1.09)
Intercept	70.00** (3.16)	70.60** (3.18)	426.43** (29.67)	415.31** (29.70)	294.98** (5.91)	291.99** (5.94)	184.11** (6.66)	181.91** (6.73)
Adj. R <sup>2</sup>	.08	.08	.15	.15	.14	.15	.08	.08
N	32 022	32 022	24 071	24 071	30 150	30 150	17 613	17 613

\*\* = p < .01, \* = p < .05

Table 2 continued.

	DRG 162		DRG 222		DRG 224		DRG 225	
Length of stay	.89 (.66)	1.64** (.84)	9.33** (.31)	8.30** (.47)	5.13** (.52)	7.19** (.72)	5.32** (.57)	6.88** (.73)
Age	.72** (.28)	.72** (.28)	-.12 (.22)	-.07 (.22)	-1.88** (.35)	-1.86** (.35)	-2.72** (.35)	-2.71** (.35)
Male	-13.01** (3.06)	-13.07** (3.06)	-6.96** (1.34)	-6.88** (1.34)	4.70* (2.11)	4.71* (2.11)	-23.19** (2.99)	-23.08** (2.98)
Private hospital	-109.43** (9.12)	-110.01** (9.13)	-80.52** (3.28)	-80.13** (3.28)	-65.46** (7.51)	-67.88** (7.53)	-141.36** (12.12)	-142.42** (12.13)
Year 2000	5.80 (3.20)	5.96 (3.21)	-15.80** (4.46)	-18.51** (4.56)	-6.66 (4.52)	-5.44 (4.53)	-5.64 (4.43)	-5.23 (4.43)
Year 2001	-11.37** (3.12)	-11.19** (3.13)	-15.24** (4.36)	-18.33** (4.48)	-11.18* (4.37)	-9.53* (4.38)	-6.86 (4.29)	-6.24 (4.30)
Year 2002	-29.51** (3.14)	-27.86** (3.34)	-51.26** (4.05)	-56.82** (4.46)	-17.12** (4.30)	-9.62* (4.67)	-11.80** (4.28)	-8.48 (4.38)
Year 2003	-46.34** (3.08)	-44.82** (3.25)	-74.40** (4.04)	-79.90** (4.44)	-35.06** (4.20)	-27.75** (4.56)	-35.96** (4.24)	-33.15** (4.31)
Year 2004	-80.60** (3.38)	-79.07** (3.54)	-90.80** (4.09)	-96.37** (4.50)	-93.46** (4.14)	-85.83** (4.54)	-74.08** (4.60)	-70.91** (4.69)
LOS* 2002-04		-1.80 (1.24)		1.83** (.61)		-4.07** (.99)		-3.92** (1.13)
Intercept	171.79** (5.11)	170.88** (5.15)	180.97** (4.66)	185.50** (4.90)	181.58** (5.79)	176.51** (5.92)	235.71** (41.19)	233.94** (5.74)
Adj. R <sup>2</sup>	.15	.15	.14	.14	.11	.11	.09	.09
N	25 122	25 122	49 223	49 223	21 468	21 468	24 897	24 897

\*\* = p < .01, \* = p < .05

Table 2 continued.

	DRG 227		DRG 229		DRG 231		DRG 232	
Length of stay	1.70** (.46)	1.78** (.59)	2.99** (.36)	2.30** (.39)	2.55** (.47)	3.86** (.63)	10.88** (.66)	13.14** (.75)
Age	-.76* (.35)	-.76* (.35)	4.38** (.26)	4.42** (.26)	2.27** (.47)	2.29** (.37)	.21 (.26)	.29 (.26)
Male	-19.39** (2.39)	-19.38** (2.39)	12.33** (1.99)	12.37** (1.99)	2.87 (3.05)	2.93 (3.05)	-6.62** (1.61)	-6.52** (1.61)
Private hospital	-108.33** (9.26)	-108.44** (9.28)	-84.70** (13.38)	-82.80** (13.38)	-120.81** (22.63)	-121.87** (22.63)	-95.62** (10.90)	-97.76** (10.90)
Year 2000	3.19 (4.76)	3.20 (4.76)	-1.40 (3.77)	-1.82 (3.77)	5.23 (6.01)	6.09 (6.01)	-8.11 (2.30)	-7.86** (2.30)
Year 2001	9.71* (4.67)	9.75* (4.67)	-7.16 (3.71)	-7.64* (3.71)	6.57 (5.87)	7.35 (5.88)	-4.10 (2.27)	-3.63 (2.27)
Year 2002	4.67 (4.63)	4.96 (4.85)	-12.61** (3.69)	-16.07** (3.75)	-8.18 (5.81)	-3.91 (5.97)	9.10** (3.37)	13.11** (3.43)
Year 2003	-22.68** (4.42)	-22.41** (4.63)	-40.28** (3.63)	-42.96** (3.67)	-21.45** (5.76)	-17.55** (5.89)	-16.71** (3.37)	-13.21** (3.41)
Year 2004	-68.21** (4.50)	-67.92** (4.72)	-81.14** (3.79)	-84.65** (3.86)	-46.03** (5.71)	-41.77** (5.86)	-25.45** (3.81)	-20.87** (3.87)
LOS* 2002-04		-.17 (.87)		5.20** (1.04)		-2.92** (.93)		-9.77** (1.55)
Intercept	187.92** (5.95)	187.76** (6.00)	106.08** (4.82)	106.23** (4.82)	154.71** (7.42)	151.82** (7.48)	128.64** (3.53)	126.84** (3.54)
Adj. R <sup>2</sup>	.08	.08	.12	.12	.06	.06	.07	.07
N	20 916	20 916	28 706	28 706	17 237	17 237	35 891	35 891

\*\* = p < .01, \* = p < .05

Table 2 continued.

	DRG 270		DRG 311		DRG 337		DRG 356	
Length of stay	-4.15** (.58)	-3.24** (.85)	-16.67** (.83)	-14.53** (1.10)	-1.98** (.63)	-2.43** (.81)	.95 (.54)	1.04 (.75)
Age	-7.52** (.25)	-7.52** (.25)	12.06** (.70)	11.99** (.70)	-6.59** (.77)	-6.60** (.77)	-1.42** (.49)	-1.42** (.49)
Male	-8.35** (2.27)	-8.32** (2.27)	8.33 (4.75)	8.51 (4.75)	-	-	-	-
Private hospital	-130.75** (15.48)	-131.00** (15.48)	-203.60** (63.91)	-209.58** (63.92)	-95.91** (14.14)	-94.29** (14.25)	-114.83 (72.15)	-115.10 (72.17)
Year 2000	1.71 (5.33)	2.16 (5.34)	12.22 (7.55)	12.49 (7.54)	23.20** (4.72)	23.19** (4.72)	-1.66 (5.71)	-1.59 (5.73)
Year 2001	18.40** (5.11)	19.08** (5.13)	12.66 (7.55)	13.12 (7.55)	27.99** (4.78)	27.94** (4.78)	-8.99 (5.47)	-8.86 (5.52)
Year 2002	3.39 (5.06)	4.91 (5.16)	5.45 (7.71)	19.83* (9.09)	23.66** (4.98)	19.19** (7.08)	-5.30 (5.31)	-4.37 (7.78)
Year 2003	-.44 (4.93)	.99 (5.02)	21.94** (7.71)	35.89** (9.01)	32.10** (4.83)	27.61** (6.99)	-31.61** (5.24)	-30.73** (7.53)
Year 2004	-9.84* (4.96)	-8.33 (5.07)	-19.25* (7.92)	-4.45 (9.34)	6.66 (5.10)	2.44 (6.97)	-54.86** (5.63)	-54.00** (7.68)
LOS* 2002-04		-1.64 (1.11)		-4.89** (1.64)		1.09 (1.23)		-.16 (.99)
Intercept	220.19** (7.73)	219.02** (7.77)	56.59** (13.40)	51.19** (13.51)	210.90** (12.86)	212.83** (13.05)	161.14** (9.28)	160.58** (9.90)
Adj. R <sup>2</sup>	.12	.12	.09	.09	.10	.10	.09	.09
N	29 982	29 982	11 040	11 040	11 627	11 627	11 792	11 792

\*\* = p < .01, \* = p < .05

Table 2 continued.

	DRG 359		DRG 363		DRG 364		DRG 494	
Length of stay	-2.00** (.29)	-4.38** (.38)	-.73** (.31)	-.54 (.36)	-.96 (1.05)	.95 (1.40)	-4.94** (.47)	-6.09** (.79)
Age	-2.55** (.33)	-2.47** (.33)	-4.13** (.30)	-4.12** (.30)	-2.99** (.33)	-3.00** (.33)	.84* (.33)	.86** (.33)
Male	-	-	-	-	-	-	-	-
Private hospital	-108.57** (16.00)	-11.39** (16.01)	-62.23* (30.29)	-62.34* (30.29)	-	-	-111.48** (13.22)	-110.30** (13.23)
Year 2000	5.50 (2.94)	4.18 (2.94)	4.63 (3.30)	4.74 (3.31)	2.10 (3.61)	2.10 (3.61)	-.66 (4.28)	-1.24 (4.29)
Year 2001	13.40** (2.86)	10.56** (2.87)	-.06 (3.25)	.03 (3.26)	11.40** (3.58)	11.54** (3.58)	-14.41** (4.17)	-15.04** (4.19)
Year 2002	-7.67** (2.88)	-27.54** (3.52)	-3.88 (3.16)	-3.40 (3.20)	11.82** (3.53)	13.05** (3.58)	-32.33** (4.17)	-37.54** (5.05)
Year 2003	-15.93** (2.88)	-35.10** (3.48)	-2.66 (3.22)	-2.24 (3.25)	4.00 (3.55)	5.15 (3.59)	-37.95** (4.08)	-43.15** (4.97)
Year 2004	-37.78** (3.02)	-56.40** (3.56)	-3.78 (3.39)	-3.35 (3.42)	-10.04* (4.00)	-8.51* (4.07)	-60.49** (4.15)	-66.04** (5.14)
LOS* 2002-04		5.14** (.53)		-.55 (.57)		-4.05* (1.97)		1.73 (.94)
Intercept	149.02** (32.00)	158.30** (4.75)	94.64** (4.53)	94.24** (4.54)	95.80** (5.59)	95.22** (5.59)	144.90** (5.37)	148.44** (5.71)
Adj. R <sup>2</sup>	.08	.08	.05	.05	.03	.03	.10	.10
N	36 211	36 211	13 032	13 032	17 400	17 400	14 011	14 011

\*\* = p < .01, \* = p < .05