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## EFFECT OF WAITING TIME REFORM ON THE PROVISION OF SURGICAL OPERATIONS

### Introduction

Long waiting times for elective surgery were typical in Finland during the early 2000s. In the comparative analysis of 20 OECD countries with 10 surgical procedures, Finland and the UK followed by Denmark, Norway, Australia and Canada were the countries with the long waiting times (Siciliani and Hurst 2003). In Finland a major health political reform, effective from March 2005, introduced a set of maximum waiting-time targets for non-urgent examinations and treatments at health centres and hospitals. Patients contacting health centres should be assessed by a doctor or other health professional within three days. Patients requiring assessment by a specialist should be offered an appointment within three weeks. Recommended hospital treatment, including elective surgery, should be offered within six months.

The Finnish health care sector invested 382 million euro (72 €per capita) in 2002-2007 to reach the waiting-time targets. Peak year was 2005 when around 2.3 % of health spending by municipalities was devoted to waiting time reform. Investment declined gradually to 0.9 % in 2007. Around 69 % of extra money due to waiting-time reform went to hospitals and 31 % to health centres. In 2005 the waiting-time for most queued operations decreased slightly but in 2006 dramatically. The number of elective patients that had waiting-time longer than 6 months decreased 42 % in 2006 (Pekurinen et al 2008, Mikkola et al 2008).

In other Nordic countries the reforms to decrease long waiting-times introduced earlier than in Finland (in Norway 1990, Sweden 1992 and Denmark 1993). Also in other tax-based financed health care systems like in the UK, Canada, Australia and New Zealand the waiting-time reforms mobilised during the 1990s. Similarly as in Finland also e.g. in the UK and Sweden the waiting-time reforms have been financed by extra resources (Jacobs et al 2003, Socialstyrelsen 2008). In the

latest waiting-time reform 2005 in Sweden, the extra resources were allocated together about 3,7 mrd € in 2005 and 2006 (Socialstyrelsen 2008). In recent reform in Sweden the waiting times decreased immediately after the reform in 2005. However, the waiting times started to increase already in 2006. In Sweden there are also very great variations of waiting times and treatment practices across the country (Socialstyrelsen 2008).

According to international experiences the waiting time reforms have been more or less successful and a lot of efforts still are needed to solve the problems of long waiting times and differences in treatment practices. Despite of large number of waiting time reforms in various countries the studies published in the international platform are rare.

The long waiting times of elective surgery is possible to decrease - increasing the number of operations, offering alternative treatment practices, using more tight criteria to surgical care and using efficient control of the lists of waiting patients. Our study aimed to evaluate and test the effect of the waiting time reform on the provision of operations with the longest waiting times in time period 1998-2006. Using panel data methods the effect of the reform was tested in the operation groups including most of all patients with waiting-time longer than 6 months. Our study described also a progress of a number of those operations compared to all non-urgent operations. In addition, an improvement of the waiting times in those operation groups was calculated. As well as a movement of a share of a number of patients with waiting time longer than 6 months was assessed. Differences between hospital districts to provide those operations before and after the waiting time reform were also evaluated.

## Background

### *The Finnish hospital care system*

In Finland the local administrative units, municipalities, are responsible for providing health care services for their residents. The Finnish municipal health care system is hierarchical and organisationally divided into primary and specialised health services. Public specialised care is primarily provided by 20 hospital districts which are administratively federations of municipalities. Hospital districts arrange specialised health services within their area and negotiate with each municipality an annual plan on the provision of services to the inhabitants of the municipality. One district comprises several hospitals providing both inpatient and outpatient specialised health care,

but there are variations in the population size, number and type of hospitals as well the management of the district. Although not stated precisely by law, in practice, hospital districts are said to operate like providers.

Most hospitals are organised management by objective (MBO) units which are responsible for their own budgets. University hospitals (5) are central hospitals for their own districts and provide tertiary level services for other districts in their area. They usually treat complicated cases. In some municipalities, health centres may also produce specialised services. Demand for hospital services is regulated via a system of referrals. In some municipalities physicians in health centres can be considered as gate-keepers, whereas in urban areas a considerable proportion of referrals originate from private physicians and occupational care.

Municipalities finance their activities from municipal taxes and state subsidies. Since 1993 hospitals receive almost all (90%) of their revenues for running costs by producing and selling their services to municipalities, the remainder coming from user charges. The revenues of Finnish hospitals and their MBO units depend mostly on the amount and price of sold services. In the case of budget deficits, extra money can be granted at the discretion of the municipal authorities.

Finnish hospitals are usually local monopolies in their area, but as public institutions they are not allowed to maximise profit or accumulate capital. However, the MBO units shoulder the responsibility of collecting revenues and covering their costs. At the same time hospitals face pressures from the municipal administration to cut expenditures and minimise their unit costs.

Nevertheless, although municipalities encourage cost-cutting and are the owners of the hospitals, they have been passive purchasers of hospital services in recent years. Being economically responsible for their own hospital district, they purchase most services from their own district. Similar provider-purchaser splits like in the UK and Sweden has not yet been introduced in Finland. However, several applications of provider-purchaser models are in use. For example, a contract controlled budget models have been tested in various hospital districts.

Unlike in Sweden and the UK, Finnish patients are unable to promote competition between hospitals, because their choice of attending hospital is restricted in most hospital districts. Recently, a couple of hospital districts have tested an extending choice of patients with their neighbour districts.

In Finnish hospitals as elsewhere in the Nordic countries, physicians and surgeons are salaried and receive only a monthly wage independent of payments from municipalities to hospitals. Thus, surgeons' motives to increase cases arise only indirectly and collectively from organisational needs. Rather than profits, the surgeons' professional ambitions may be the incentive to increase cases and revenues in their MBO unit. Increased cases and revenues may be needed to convince municipal decision makers of the need for the existence of an MBO unit. On the other hand, the long waiting times and lists in non-urgent care could be a way to show that professional and financial incentives to increase cases in elective surgery are too weak.

### *The waiting time reform*

The Acts on specialised medical care (Acts 855-858/2004, Decree 1019/2004, Government Bill 77/2004) determines the maximum time (6 months) to arrange hospital treatment. Also the joint municipal boards of hospital districts answer for providing the specialised medical care prescribed in the Act in their region in accordance with uniform medical principles. At the first stages of the reform (2005-2007) the Ministry of Social and Health Affairs controlled the implementation of the waiting time reform. Since 2008 the control of the materialisation of the Acts was transferred to the National Authority of Medico-Legal Affairs (NAMLA). NAMLA is entitled to impose a conditional fine to health care organisations if the Acts will not go ahead.

Objectives, financial incentives and effects of the waiting time reform are meaningful to discuss in a traditional principal-agent frame. The principals are state and NAMLA. The agents are hospital districts, municipals and MBO-units inside hospital districts (Figure 1).

In addition to set the maximum times to arrange treatment, the aim of the legislative amendments was to secure access to treatment on equal grounds irrespective of the place of residence. In practice the aims of the waiting time reform was to improve access to non-emergency treatment, decrease long waiting times and encourage to use uniform treatment practices. Indirectly the aim of the waiting time reform was to increase supply of public hospital care. However, if hospital districts are not able to produce services in their regions themselves, they should purchase or outsource absent services from another hospital district or a private provider. Indirectly the state also aimed to save in NHI (National Health Insurance) reimbursements, especially in sickness benefits. Because of faster access to treatment presumed, sickness benefits were estimated to reduce.

The waiting time reform changed the operational environment of hospital districts in many ways. Since previous remarkable health political reform - state subsidy reform 1993, the role of the state to guide hospital production had been very modest. Due to the Acts of waiting time reform the state as a principal took a more active role in controlling hospital production by monitoring waiting lists and a number of patients with waiting time more than 6 months.

In advance, the state together with municipalities gave extra resources (financial incentives) to agents i.e. hospital districts 50 million € in 2003-2004 to decrease long waiting times in specialised medical care. Despite of extra resources the waiting times were still long in 2004 and 2005. After the Acts came into force on 1 March 2005, the state started efficient monitoring the queues of hospital districts. The state arranged regular questionnaires of the queues and seminars to the operative management of the hospital districts. Due to the monitoring efforts of the state and a public discussion of hospital districts with long waiting times and queues, the queues and the waiting times started to decrease in 2006. Especially the number of patients that had waiting time over 6 months decreased (Mikkola et al 2008). The information on waiting times and queues for surgical operations was not publicly available before the waiting time reform.

The hospital districts were not able to increase operations with normal working time and efforts. They started to use several forms of financial incentives i.e. extra payments to the staff in the MBO-units in hospital district to increase operations and decrease the waiting times. In most hospital districts MBO-units did overtime work. Over half of hospital districts paid more than normal overtime work payment to their personnel. Also the outsourcing of services increased especially in operations that had longest waiting times (Tuominen et al 2008, Mikkola et al 2008).

## Data

Data obtained from the Finnish Health Care Register (FHCR) covered the number of operations among 14 operations groups from Finnish hospital districts from 1998 through 2006. The operations groups were created using a number of patients that had longer waiting-time than 6 months. The waiting time was determined as a difference between a date when a patient is set to a queue and a date when a patient operated in a hospital. The biggest operation group that had most of all patients queued longer than 6 months was cataract operations (CJE 20) (Table 1). The operation groups were defined to correspond to the criteria of non-urgent care as accurate as possible. E.g. the

emergency duties were excluded. Also hip fractures were excluded as far as hysterectomies because of cancer. Our data covered operations in both public and private sector. In 2006 the data covered 131 900 operations (with 19 795 operations in private sector) containing 63% outpatient day surgeries. To compare a progress of operations most waited, we used also a data on all non-urgent care included an operation in 1996-2008. In 2006 there were 418 344 non-emergency treatment periods with an operation.

## Methods

The waiting times were measured using a median, because a distribution of waiting times was skew. Data on waiting times was used only in a national level to describe the development of waiting times in the reform years 2004-2006. Comparisons of the waiting times between hospital districts was not reason to report, because the reporting accuracy of the waiting times in hospital districts varies lot. Also there are differences observed in the determinants of waiting lists and the criteria for access to non-emergency treatment between hospital districts (Järvelin and Linna 2004). However, because of a lot number of observations of operations with waiting times, the national level analyses were estimated to be definite. A share of the number of the patients waited more than 6 months of all operated was also calculated for years 2004-2006 (Table 1). The data on all non-urgent care including an operation was used to compare a trend in the percent development of the number of operations (14 operations groups together) that had the longest waiting times (Figure 2).

The percent changes in the number of operations (14 operations groups together) that had the longest waiting times were also calculated at the hospital district level. Those calculations were used to capture regional variations how the hospital districts were changed their provision of services before and after the reform (Table 2).

The effect of the waiting time reform on the number of operations in 14 different operation groups was tested using identical panel data methods. Using the same variables in the testing process, the estimations results between different 14 operations groups was possible to compare (Table 3).

The regional standardised procedure ratio was used as a dependent variable in the test. To calculate these ratios regional operation rates per population for the individual procedures were adjusted for age and sex using the indirect standardisation method. For all operations studied, we were able to

establish panel data on the standardised procedure ratios in 1998-2006 for 20 hospital districts (N=20, T=9).

Panel data models were chosen as a testing technique because we wanted to capture also unknown hospital district effects. The most influential, and potentially unknown, hospital district effects were assumed to be local treatment strategies and clinical practices, and they were also assumed to be time-invariant, because the surgeons which determine clinical practices have usually created permanent practices and organisational cultures.

The effects of the waiting time reform on the number of operations were tested using dummy variable for years 2005-2006 and a linear trend. The time period 2005-2006 as the dummy-variable described the effect of the reform compared to earlier time period 1998-2004. The waiting-time reform was assumed to increase operations. A linear trend variable was included a model to capture a general progress of a number of the operations. The results were calculated using point estimates of panel regression analyses.

## Results

Before the waiting time reform 2004 the longest waiting time were in knee replacements (median 208 days) and cataract operations (median 201 days). The shortest waiting times were clearly in tonsillectomies (median 48 days), operations of peripheral nervous system (median 61 days) and knee meniscus (median 62 days). The median waiting times clearly decreased in almost all operation groups after the waiting time reform especially in year 2006. In knee meniscus, tonsillectomies and shoulder operations the median waiting time grew slightly (Table 1).

Before the reform 2004 a share of over 6 months waited patients of all patients operated were highest in knee replacements (41%) and in hip replacements (32%). The share of patients waited over 6 months clearly decreased after the reform especially in year 2006. However, the share of over 6 months waited patients was still over 20% in knee and hip replacements and in foot bone operations (Table 1).

A progress of the number of operations most waited was unstable. We found that in year 2001 when municipal physicians went on strike, a number of operations decreased. The number of operations

sharply increased (+9%) after the strike in 2002. An effect of the waiting time reform seemed to make a similar peak. Before the reform the number of operations decreased in 2003 and 2004, while in the first reform year 2005 their number sharply increased (+9%) and again decreased in 2006 (Figure 1, Table 2).

Our finding was also that the number of operations most waited deviated from a trend of a number of all non-urgent operations. The number of operations most waited (14 operation groups together) decreased in 2004 while the number of all non-urgent operations increased slightly. After the reform 2005 and 2006 a progress in the number of operations was similar in operations most waited and all non-urgent operations (Figure 1).

There were great variations between hospital districts how they increased or decreased a provision of the number of operations most waited (together 14 operation groups). Before the reform in 2003 and 2004 only 4 hospital districts (Pirkanmaa, Kymenlaakso, Pohjois-Savo and Vaasa) increased the operations most waited. There was only one hospital district - Vaasa - which increased operations in the time period 2003-2006 (Table 2).

Before the reform in 2004, 12 hospital districts decreased the provision of the number of operations. On the contrary, in the first reform year 2005, 16 hospital districts increased their provision of operations most waited. In 2006 again 14 hospital districts decreased a number of operations (Table 2).

### *Panel data analyses*

In the study period 1998-2006, 7 out of 14 operations groups had a growth trend which was statistically significant. According to coefficients the most intense growth trend was in knee replacements. An inverse development was observed in 4 operations groups. A decreasing trend was detected e.g. in varicose vein operations. 3 operations groups had not statistically significant trend (Table 3).

A time period after the waiting-time reform compared to an earlier time period before the reform (including a trend effect) increased operations in 6 out of 14 operations group. The most vigorous



effect of waiting time reform on the age and sex standardised number of operations was in shoulder operations (+33,8 %), knee replacements (+28,9%) and foot bone operations (+25,5%). Also statistically significantly the waiting time reform affected also to groin hernia operations, knee meniscus and operations of peripheral nervous system. The inverse effect faced 3 operations group: operations of urinary incontinence (-36,2%) cataract operations (-13,7%), and tonsillectomies (-8,9%). According to our analyses the waiting time reform did not affect statistically significantly on biliary operations, varicose vein operations, hip replacements, nasal cavity operations and hysterectomies (Table 3).

In 7 operation groups, models succeeded explain by over 70% of the development (increase or decrease) of the number of age and sex standardised operations. The poorest explanation ratio, under 50%, faced cataract operations and foot bone operations. A large unexplained hospital district effects accounted for the good explanation ratio in most models estimated. The time-invariant unexplained hospital district effects were high (over 70%) especially in knee meniscus, nasal cavity operations and hysterectomies. The independent variables: a trend and a dummy-variable considering the reform years 2005-2006 succeeded explain the development of age and sex standardised operations over 20% especially in knee and hip replacements, tonsillectomies, operations of peripheral nervous system and shoulder operations (Table 3).

## Discussion

The official Act to set maximum waiting time was an efficient tool to decrease the waiting times in operation groups that had most patients waited over 6 months. Most hospital districts increased the number of operations in 2005. But the waiting times of operations most waited started to decrease not before than in 2006. It seemed that an increase in operations in 2005 later decreased the waiting times of patients operated in 2006. Especially, due to the waiting time reform an increase in the number of operation groups with the highest waiting times was prioritized. On the other hand, in some operation groups likewise knee meniscus the median waiting time was not decreased like as in the operation groups with the highest waiting times. According to these results the waiting time reform focused on decreasing the highest waiting times, but increasing slightly the waiting times of some patients in certain operation groups. Such operation groups had relative low median waiting time (near 6 months) already before the reform. It seems that in elective surgery the waiting times will transform close to a maximum waiting time - 6 months in most operation groups.

The number of operations with long waiting times generally decreased in 2003 and 2004. This result was not expected. In those years municipalities and the state allocated extra resources to hospital districts to decrease long waiting times and lists. It seemed that extra resources were allocated at least partly to other services than to produce the operations with long waiting times. Only rare hospital districts were allocated the extra resources in 2003 and 2004 to speed the production of operations with longest waiting times (Table 2). Those districts e.g. Vaasa took various new development projects in use to make their production process more efficient. In addition, for example, the hospital district of Pohjois-Savo increased the provision of the number of operations during years 2002-2005. Pohjois-Savo was also the most productive hospital district in a benchmarking measurement of hospital productivity (Stakes 2008).

The effect of waiting time reform on a progress of a number of operations seemed to be similar as the effect of a strike of physicians in 2001. According to the study of Tuominen et al 2008 hospital districts used a lot of extra payments to their staff to decrease the long waiting times and lists. Before an official waiting time reform 1 March 2005 surgeries might wait better contracts of extra payments and delay to start to increase operations. Moreover, even a number of physicians were highest ever in Finland - there were a lack of e.g. orthopaedics and other specialists who could operate the operations demanded most.

The statistical analyses showed the waiting time reform increased mostly a number of operations in musculo-skeletal diseases. The effect of waiting time reform was largest in shoulder operations, knee replacements and foot bone operations. Despite of the increase in the number of the shoulder operations their median waiting time decreased not much. Similarly, as far as the number of operations of peripheral nervous system and knee meniscus increased due to the waiting time reform their median waiting time did not decrease. In those operations the median waiting time was among the shortest before the reform.

According to our study the reform increased knee replacements more than hip replacements. The reform did increase hip replacements statistically significantly. A trend to increase knee replacements more than hip replacements have observed also in a study on the development of operations in long time series 1987-2002 (Mikkola et al 2005). Numerous studies have shown that total hip and knee replacements are medically effective and cost-effective procedures to relieve pain and improve physical function ( Räsänen et al 2007). In recent study of Räsänen et al 2007 total hip

replacement was clearly more cost-effective operation than knee replacement. The cost per OALY gained from knee replacement was twice that gained from hip replacements. Thus, our result suggests that in total joint replacements hospital districts did not prioritise most cost-effective operations. Knee replacements might be demanded and prioritised more than hip replacements, because a production of hip replacements has a longer history and knee replacements were introduced later in total joint surgery. Also knee replacements might be prioritised because their median waiting time was longer than in hip replacements. Moreover there were a larger number of patients waited over 6 months in knee replacements compared to hip replacements (Table 1). In addition, knee replacements seemed to be more costly and have higher hospital price compared to hip replacements. Therefore, a production of knee replacements increases revenues of hospitals more than a production of hip replacements.

An unexpected finding was that the waiting time reform decreased cataract operations. However, in cataract operations a decrease in the median waiting time was huge in 2006 (Table 1). According to our data, cataract operations increased absolutely sharply in 2005, but decreased in 2006 (Table 1). One reason for the result of our study is that our panel data analyses used the years 2005 and 2006 as an interpreter of the waiting time reform, not only the first reform year (1 March 2005 - December 2005). In addition, according to recent study of Räsänen et al 2006, the cost of cataract surgery per quality-adjusted life year gained was much higher than in early international studies. Therefore it is also possible that long waiting times were decreased, not only increasing operations in 2005, but also reorganising a treatment of patients that were set to a waiting list using too loose requirements of operation indications of cataract operations.

The waiting time reform decreased a number of urinary incontinence operations, but had no effect on hysterectomies. The waiting time reform probably reinforced the decreasing trend in operations of urinary incontinences. Alternative treatment practices have decreased hysterectomies, for example, new conservative cost- efficient treatment practices as medicines i.e. hormonal therapies has been implemented for treatment in menorrhagia (Hurskainen et al 2001). Despite of a decreasing trend of those operations, in both operation groups the median waiting time decreased remarkable after the reform (Table 1). Because the number of those operations was not increased, our result implies that hospital districts were reorganising the waiting lists or offered other alternative treatments for patients.

In our study tonsillectomies had clearly a decreasing trend. The number of tonsillectomies has probably decreased because treatment practices were in a changing process. The waiting time reform reinforced this change. A median of waiting time of tonsillectomies decreased only slightly in 2005 and rose again in 2006.

The waiting time reform had no statistically significant effect on the number of varicose vein operations even those operations were among the operations with longest waiting times. However, their median waiting time decreased significantly (Table 1). The reorganising the waiting lists may be one reason to this development, but also according to our data, varicose vein operations were increased earlier the reform, in 2004 (Table 1).

In our analyses the waiting time reform had no effect in the number of biliary and nasal cavity operations even their median waiting time decreased clearly in 2006. They had a decreasing trend in our time series, but their number suddenly in the first year of the reform increased, but decreased again in 2006. In the groin hernia operations the development was also almost similar than in biliary and nasal cavity operations, but in our analyses the waiting time reform increased groin hernia operations statistically significantly.

Because of a panel data setting models succeeded to explain a movement in the number of operations in most operation groups. The unexplained hospital district effects were biggest in hysterectomies, nasal cavity operations and knee meniscus and lowest in hip replacements and cataract operations. The big unexplained hospital district effects imply variations in treatment practices established and other unchanged factors e.g. a size and service pattern of hospital district affecting a number of the rate of operations.

Our panel data analyses were done as a testing procedure and the models were structured very simple. However, a similar structure of the models made possible to compare the effects of waiting time reform between separate 14 operations groups. To model more accurately determinants of the development of the number of operations would need variables that we could not get in official health care registers. For example, a number of surgeries doing exactly cataract or knee or hip replacements should collect from every hospital separately. However, there are some variables that we could utilise better in the future research if we will attempt to model the development of the number of operations in some specific and most interesting operations groups likewise hip and knee replacements. Such variables are e.g. a progress of other orthopaedic operations describing the

general trend in orthopaedic operations or substitution effects between total joint replacements and other orthopaedic operations. In addition, for example, to model the development of cataract operations, a number of operations done in private sector and a share of outpatient care could be useful factors.

It would be interesting to model also more accurate a connection between waiting time and a number of operations. It seemed that this might be possible in few operation groups in where hospital districts registered the waiting time accurate enough. In preliminary findings e.g. in cataract surgery, there was only 11 hospital districts that were registered waiting time over 50% of patients operated. This was also the reason why we did not use hospital district level data describing the development of waiting times instead of the median waiting times in the national level.

## Conclusions

The waiting time reform seemed to be successful immediately after the official Act of the reform 1 March 2005 to increase a number of operations and a decrease in waiting times. Before the reform the earmarked extra resources in 2003 and 2003 went partly in other services than to a production of operations most waited. Our study suggests that approving effects of the waiting time reform were not possible without the monitoring efforts used by a principal (Ministry of Social and Health Affairs). Most agents i.e. hospital districts would not be succeeded to decrease waiting times and increase operations without using extra payments to their staff in the MBO-units. According to preliminary statistics 2007-2008, a threat of National Authority of Medico Legal Affairs to impose a conditional fine to some hospital districts has decreased further a share of over 6 months waited.

A tight regular monitoring seemed to be an efficient way to decrease or keep the waiting lists and times relatively short. However, alternative means as financial incentives could be used also in the positive way e.g. giving extra money to those hospital districts which have been succeeded to keep the waiting lists short and similarly increased cost- efficient operations and productivity.

According to our study it is possible to come to a conclusion that increasing operations was not the only way to decrease waiting times, because in some operation groups a median waiting time decreased without an increase in operations. Controlling waiting lists and using more tight criteria for surgical operations might also be reduced the number of waiting patients and therefore decreasing the median waiting times.

Our study showed that the provision of surgical operation groups with the longest waiting times e.g. knee replacements was prioritized. This may lead up an increase in waiting times in some of operation groups. In other words, in the long run the waiting times of all elective operations may reach the border line of 6 months. However, there are empirical evidences that e.g. in knee replacements a longer waiting not changed a quality of life (HRQoL) and a cost-effectiveness as much as in some cases as for example neurosurgical spinal surgery (Räsänen et al 2006). In addition, the studies have been showed that in knee and hip replacements a quality of life (HRQoL) did not deteriorate during the time-span of the waiting time to an operation (Hirvonen 2007). Thus it should be evaluated more accurate if the maximum waiting time 6 months would be optimal to all non-emergency treatments.

Table 1. The biggest operation groups patients waited longer than 6 months and the development of the number of operations from former year. A median waiting times of the operations groups in 2003-2006. A share of the number of patients waited over 6 months of all patients in operation group operated in 2003-2006.

Table 1.

	The operation code	The development of operations from former year, %			A median of a waiting time, days			A share of patients waited over 6 months, %		
		2004	2005	2006	2004	2005	2006	2004	2005	2006
Cataract operations	CJE20	-3,4	10,2	-9,8	201	178	104	31	31	14
Knee replacements	NGB 20,NGB40	-5,3	37,3	11,8	208	192	149	41	41	29
Groin hernia operations	JAB	1,8	11,2	-9,0	77,5	75	58	17	14	9
Biliary operations	JKA21, JKA20	-3,8	11,3	-10,8	82	89	68	19	21	13
Varicose vein operations	PHD	9,0	-1,8	-15,0	182	162	112	24	23	16
Knee meniscus	NGD05,NGD10,NGD15	-0,1	15,1	6,5	62	64	66	8	8	5
Hip replacements	NFB50,NFB30,NFB40*	-6,5	18,4	5,7	154	147	124	32	31	22
Tonsillectomy	EMB10, EMB 20,EMB30	-8,7	-12,5	-1,6	48	42	50	5	4	2
Operations of peripheral nervous system	ACC59, ACC51-54	-2,5	21,3	5,7	61	70	68	9	11	11
Foot bone operations	NHK10,NHK30,NHK40	4,5	16,1	3,5	160	168	141	27	28	22
Operations of urinary incontinence	LEG0,LEG10,LEG20,LEG96	-5,5	-21,1	-26,0	147	108	79	24	17	5
Nasal cavity operations	DJD20	0,4	6,2	-16,1	108	104	98	22	19	13
Hysterectomy	LCD10,LCD04,LCD11,LCD40**	-0,8	-2,7	-14,6	111	98	74,5	22	19	6
Shoulder operations	NBG00,NBG01,NBG10,NBG15	10,2	22,9	16,5	104	97	98	18	16	12

\* excluded S72.0, S72.1,S72.2

\*\* only, if diagnosis D25,N80,N92

Table 2. A percent movement of a number of operations in 14 operations groups together in different hospital districts.

Hospital district	1999	2000	2001	2002	2003	2004	2005	2006
Helsinki ja Uusimaa	4,7	1,3	-4,9	14,0	-9,3	0,5	12,0	-5,1
Varsinais-Suomi	-0,1	-5,3	-2,7	9,0	-1,9	-9,0	12,5	0,9
Satakunta	2,6	0,1	-5,1	8,1	5,5	-2,7	2,2	-2,6
Kanta-Häme	29,9	-2,2	-2,4	2,7	1,1	-1,2	-6,1	-6,8
Pirkanmaa	-1,9	4,2	-7,5	17,7	3,8	5,4	9,5	-4,4
Päijät-Häme	17,5	-1,4	-2,4	0,0	3,8	-4,0	31,7	-10,1
Kymenlaakso	10,5	2,7	13,0	-9,0	4,0	2,7	13,9	-15,4
Etelä-Karjala	7,2	-3,8	-6,0	6,1	1,2	-9,3	2,8	12,0
Etelä-Savo	-10,0	29,6	29,8	-12,4	11,9	-13,3	5,9	-4,3
Itä-Savo	-1,2	3,2	3,3	1,2	4,4	-13,2	11,7	-8,5
Pohjois-Karjala	20,9	-7,5	-5,0	1,5	-4,4	-5,7	22,0	-4,4
<b>Pohjois-Savo</b>	<b>0,6</b>	<b>2,1</b>	<b>-8,3</b>	<b>13,7</b>	<b>10,8</b>	<b>3,1</b>	<b>9,2</b>	<b>-12,2</b>
Keski-Suomi	2,7	6,4	-14,7	5,2	13,2	3,4	-4,7	-3,3
Etelä-Pohjanmaa	2,2	-2,2	-3,0	12,3	-6,6	0,5	3,1	2,4
<b>Vaasa</b>	<b>-12,1</b>	<b>15,4</b>	<b>-3,3</b>	<b>0,7</b>	<b>1,7</b>	<b>7,0</b>	<b>11,3</b>	<b>2,8</b>
Keski-Pohjanmaa	7,9	0,5	-12,6	9,3	4,3	-25,0	17,2	-1,4
Pohjoispohjanmaa	20,3	6,0	-9,1	18,7	-1,6	-4,9	6,7	4,0
Kainuu	-1,1	6,4	4,4	-3,9	-20,9	12,6	-4,9	1,2
Länsi-Pohja	7,0	0,0	21,9	14,0	13,5	-4,9	-8,6	-0,3
Lappi	-3,2	1,9	34,2	5,4	19,3	-12,2	1,8	-8,4
All together	4,9	1,4	-3,2	9,0	-0,4	-2,0	9,0	-3,7



Table 3. The testing results on the effects of the waiting time reform on age and sex standardised operations most waited in panel data 1998-2006.

Table 3.

Testing results of the one-way fixed effects model

Dependent variable = age and sex standardised number of operations

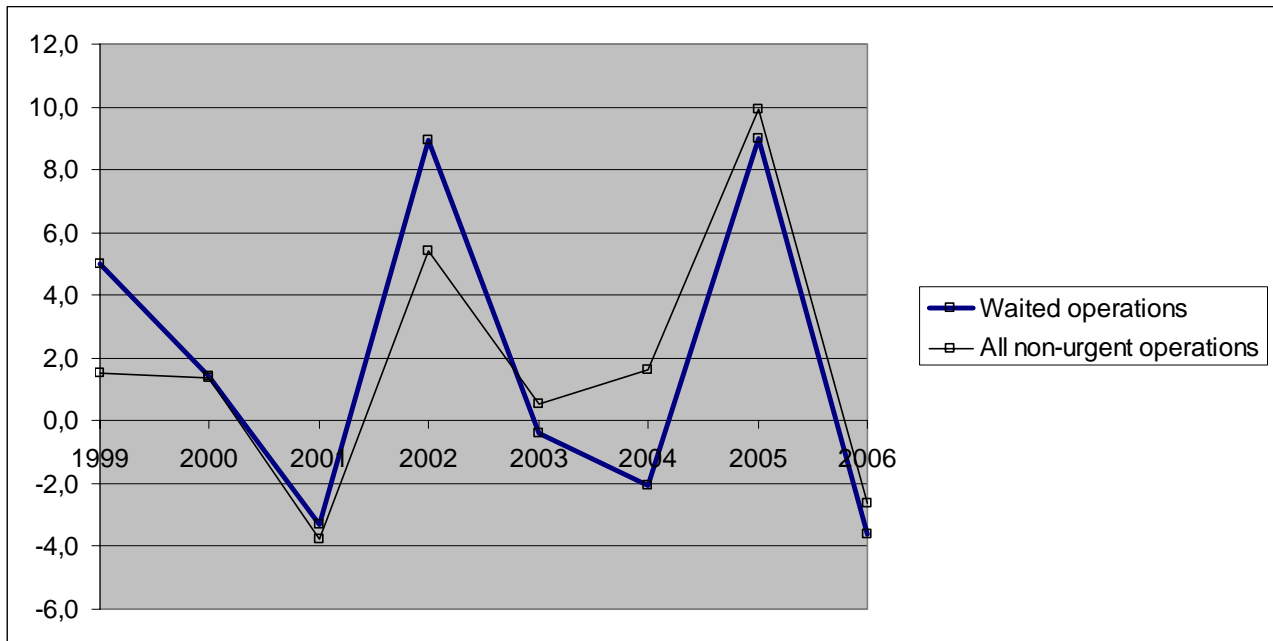
	Independent variables and coefficients							R-squares, %		
	Linear trend	T-value	P-value	Years 2005-2006	A point estimate	T-value	P-value	Total effect	Hospital district effect	Independent variables
Cataract operations	4,2	4,5	0,0	-15,6	-13,7	-2,7	0,0	44	36	7
Knee replacements	7,2	7,9	0,0	26,7	28,9	4,7	0,0	72	52	20
Groin hernia operations	-2,3	-4,6	0,0	8,3	8,4	2,7	0,0	51	44	7
Biliary operations	-1,2	-2,0	0,0	-0,7	-0,7	-0,2	0,9	63	61	2
Varicose vein operations	-6,7	-6,4	0,0	7,4	8,2	1,1	0,3	61	44	17
Knee meniscus	1,6	2,5	0,0	10,4	10,4	2,6	0,0	77	70	7
Hip replacements	2,8	4,6	0,0	6,6	6,7	1,7	0,1	54	33	22
Tonsillectomy	-3,6	-7,0	0,0	-9,8	-8,9	-3,1	0,0	83	63	20
Operations of peripheral nervous system	6,3	7,5	0,0	12,9	14,0	2,5	0,0	81	56	22
Foot bone operations	-1,8	-1,6	10,0	25,8	25,5	3,9	0,0	45	39	6
Operations of urinary incontinence	6,9	6,6	0,0	-47,8	-36,2	-7,4	0,0	58	43	15
Nasal cavity operations	-1,1	-1,2	0,2	0,0	0,0	-0,1	1,0	73	72	1
Hysterectomy	0,7	0,1	0,4	-14,3	-12,7	-2,8	0,9	74	72	2
Shoulder operations	5,5	4,9	0,0	29,4	33,8	4,2	0,0	74	49	25

Figure 1. Principals and agents in the waiting time reform - their objectives, financial incentives and monitoring efforts.

Figure 1.

	<b>Objectives</b>	<b>Financial incentives and monitoring</b>
<b>Principals</b>		
State	Improve access to hospital care  Improve to use of uniform treatment practices	Earmarked 25 million € in 2003-2004 to decrease waiting times and lists before the reform  Controlling the implementation of the reform 2005-2007 using questionnaires and seminars
National Authority of Medico Legal Affairs (NAMLA)	Monitoring the implementation of waiting time reform	Controlling the implementation of the reform since 2008 A punishment tool : a conditional check
<b>Agents</b>		
Hospital Districts and their MBO-units	Decrease waiting times and lists under pressures and monitoring created by principals  Maximise financial incentives via waiting time reform	Extra payments to staff in the MBO-units  Requirements of extra resources for implementation of waiting time reform
Municipals (principals or agents?)	Decrease waiting times and lists under pressures and monitoring created by principals  Cost containment	Earmarked 25 million € in 2003-2004 to decrease waiting times and lists before the reform

Figure 2. A progress of the number of operations in 14 operation groups together and the development of the number of all non-urgent operations, % .



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