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**CLAIMS AND COMPENSATIONS FOR PATIENT INJURIES IN A NO-BLAME
INSURANCE SCHEME**

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INTRODUCTION

Patient safety issues and medical malpractice have raised growing concern in many countries. In Finland, radical expansions in the number of claims and amount of compensation payments have not been observed, but also here, the incidence of claims and the total amount of compensation payments for health care-related injuries have been growing steadily. Moreover, significant regional variations have emerged in the incidence of filing a claim.

Most studies on medical malpractice have been carried out in countries where patients' claims are handled by the tort system, in particular the United States. These studies have already provided a considerable amount of information on the functioning of the tort system in respect with health-care –related claims and injury prevention. Such information would also be very much needed on no-blame schemes. These are separate systems that have been established, for instance in Finland, Sweden, and New Zealand, to compensate patients for injuries arisen from health or medical care and do not require proof of negligence. No-blame schemes have attracted broad interest also in countries without such a system, because they are said to entail lower total costs and to be more appropriate for compensating injuries in complex health care systems. However, profound assessment of these beliefs and other aspects of the performance of the schemes have not been carried out so far.

The aim of this study was to obtain information on factors associated with claims and compensations for patient injuries in a no-blame scheme. Moreover, the study offers further information on the functioning of the enterprise liability model which has also been discussed in some countries as an alternative to traditional arrangements for dealing with malpractice claims.

Main features of the health care system in Finland

In Finland, health services are largely publicly funded and provided. The 415 (in 2008) municipalities have the main responsibility for organising and financing health care for their inhabitants. Primary health care is mainly provided by health centres, which employ health professionals from multiple disciplines and are owned by municipalities or groups of municipalities.

For the supply of specialised health care, the country is divided into 20 federations of municipalities, the hospital districts (in addition, the Åland Islands form their own district). They arrange both inpatient and outpatient specialised health services within their area. The number of hospitals within a district is often three or four but the number varies. So do the type of hospitals, the type of services provided, the population size, and the management of the district. Most complicated cases are referred to one of the five hospital districts that maintain a university hospital.

Hospital districts negotiate annually with each of its municipalities over the amount and type of services to be provided and an estimate of their total costs. Hospital districts charge for their services by utilising differing pricing methods including case-based prices, bed days, Diagnosis Related Groups (DRGs), and varying combinations of these. The bulk of hospital districts' revenues consist of payments paid by municipalities. The latter finance health services out of their own tax revenues, state subsidies allocated to municipalities according to certain need criteria, and user fees.

Health care reforms from 1994 to 2003

The first years of the time period from 1994 to 2003 covered by this study were characterized by the adaptation to the gradual reduction in state regulation starting in the 1980s and the state subsidy reform in 1993. Both expanded municipalities' autonomy in organising health services and allowed to take into account local needs and conditions. As a result, towards the end of the 1990s, numerous local projects and new schemes for providing health services had emerged. Some areas had introduced models similar to the purchaser-provider split, while some others had transferred local hospitals and primary health care centres under the direction of one and the same management. In 2000, the Helsinki University Hospital, the hospital district of Helsinki and Uusimaa, which until then operated as three separate units, were merged into one single district to improve efficiency of service provision within the metropolitan area.

Before 1994, a national campaign had promoted the shift of service provision from inpatient to outpatient care. The tendency to favour outpatient care continued throughout the 1990s and the beginning of the new millennium and was boosted by technological developments such as the introduction of new pharmaceuticals and day surgery.

Towards the end of the time period from 1994 to 2003, the growth in waiting times for many treatments became an increasing concern. Waiting times reached their peak in 2003 and 2004. Consequently, in 2005, a waiting time guarantee was launched in the entire country with the aim to reduce waiting and improve access to care.

A further characteristic of that time was that patients in the public sector did not have any choice of doctor or provider unit. Moreover, measurement and management of quality and patient safety at national level were modest.

The patient injury compensation scheme in Finland

In Finland, the processing of disciplinary matters of health professionals and insurance for patient injury compensation have been separated and are mostly handled outside the tort system. Disciplinary matters of health professionals are dealt with by the National Authority for Medicolegal Affairs and the social and health departments of the five provincial state offices. The former handles most serious complaints involving large parts of the country or death or severe damage, which may result in issuing a health professional a note, a written warning, or other kind of guidance, or in the partial or total restriction of professional rights. In 2006, the Authority's tasks were extended from the supervision of individual professionals to the supervision of health care delivery in general implying that the Authority can undertake actions against an entire hospital or other provider organisation if necessary.

The provincial state offices supervise health professionals and participate in the development of health services within their respective areas. They handle less serious complaints than the National Authority for Medico-Legal Affairs. Only about 20 cases regarding medical or health care are handled by the courts yearly.

Similar to countries such as Sweden and New Zealand, a separate insurance scheme has been established in Finland to provide patients compensation for health care –related injuries. It is run by the Patient Insurance Centre. The centre is a consortium of private insurance companies. Nevertheless, it is largely subject to similar regulation as public authorities and has the only right for handling compensation payments for patient injuries in Finland.

The share of claims determined by the Patient Insurance Centre as compensable has been from year to year about a third of all claims. About 80% of these have taken place in the public sector, and of these, roughly two-thirds in specialised health care. The medical procedures, for which compensation is frequently paid, comprise treatment of fractures, arthroplasties, and certain procedures in gynaecology and obstetrics.

The criterion applied by the Patient Insurance Centre in the vast majority of claim settlements is whether the injury probably originated from health or medical care and whether an experienced health professional would have acted differently from what was done and consequently prevented the injury. An injury is thus compensable if the standard of an experienced health professional was not reached. However, in less than 10% of all compensable claims, the Patient Insurance Centre's decision is based on criteria other than the standard of an experienced health professional. These include an infection, excessive injury, accident related to patient's care (for instance, during transportation), defective equipment, fire, and deficiencies in the delivery of a pharmaceutical.

Compensation payments consist of expenses the patient has had to pay for treating the injury, for instance, payments for additional hospital stays, rehabilitation, and pharmaceuticals. Moreover, the patient is paid compensation for income loss and for immaterial costs such as pain. If patients are not satisfied with the Patient Insurance Centre's decision, they may bring their case to court.

The financing of compensations for patient injuries in the public and private health sector occurs in different ways. In the public sector, hospital districts bear the total costs of compensation payments for injuries at both their own institutions and the primary care units located within their geographical area. In contrast, private health care providers have to take their insurance from one of those private insurance companies, which are members of the Patient Insurance Centre's consortium and which compensate for injuries in the private sector.

The "patient insurance pool" attached to the Patient Insurance Centre operates the financial flows for compensations in the public sector and distributes each hospital district yearly a debit note regarding the district's payments for injuries in the past and an estimate for future outlays as well as overhead costs for the processing of claims. Overall, administrative costs of the centre are about 20% of the total outlays of the centre.

Compensation paid to patients represents a net cost of patient injuries, since these are the “left-over” of costs patients have not been compensated for by other institutions. Hospital districts, and in the end the municipalities and the state, probably finance a substantial part of the total costs of patients injuries, in addition to being the financiers of patients’ compensation payments in the public sector. The Social Insurance Institution probably also pays for some part of damages by subsidizing pharmaceuticals in outpatient care and by paying for sickness allowances. However, data do not exist on the total costs of patient injuries or costs paid by individual institutions for injuries in Finland.

The scheme for dealing with patient injuries in the public sector in Finland is in effect an enterprise liability model [1]. The central idea of this model is that an enterprise such as a hospital or other kind of health care provider as an organisation instead of an individual professional is held liable for injuries. This is believed to lead to better control of malpractice costs and to encourage actions to prevent injuries, since a hospital is thought to be in a better position than other authorities to implement quality and patient safety measures and to obtain health professionals’ commitment to these.

Hospital districts in Finland can be viewed as the enterprises in the enterprise liability model, because they are financially liable but individual health professionals not. This should in theory create an incentive for undertaking measures for injury prevention. In fact, two different incentive mechanisms exist to promote injury prevention: one financial through compensation payments for patient injuries paid via the Patient Insurance Centre and one “disciplinary” through the National Authority of Medico-Legal Affairs, the provincial state offices, and in ultimate cases, the courts. To what extent, in practice, hospital districts manage to implement quality assurance programs and injury prevention at individual hospitals and clinical departments and even in primary health care and to make individual health professionals comply with them, is an open research area.

Incidence of claims and compensations over time

From 1994 to 2003, those districts with a high number of claims filed per inhabitants ranked highest over the entire time period, and vice versa, those districts with a low number of claims maintained their relatively low numbers (Figure 1). However, rates seemed to converge to some

extent towards the end of the time period. The incidence of claims in the hospital district with the highest number at the beginning of the period was almost 2.5-times the incidence of the hospital district with the lowest incidence, while at the end of the time period, this difference was less than 2-times.

In regard with compensations, there seemed to be more variation in the incidence of compensations within a single hospital district over time than in the incidence of claims (Figure 2). Similar to claims, at the beginning, the incidence of compensations in the hospital district with the highest rate was almost 2.5-times the lowest, and towards the end, this difference was 2.2-times. During the years from 1999 to 2001, the hospital district curves seem to come closest to each other, but start diverging in the subsequent time period. This might reflect the change in the Patient Injury Act in 1999 which altered the compensation criteria and, in consequence, reduced the number of compensations for injuries involving an infection.

A plot of the incidence of claims versus the incidence of compensations shows that the probability of compensation is not constant but increases at a diminishing rate (Figure 3). This suggests that a growth in the number of claims entails a growth in the number of compensation payments involving less significant injuries.

Theoretical views on factors associated with patient injuries

Factors affecting patient injuries are divided here into two categories, internal and external. The first refers to factors that can be directly influenced by a hospital district and the second to factors that are largely given and out of the control of a hospital district.

One internal factor is the budget of a hospital district. Studies have shown total health care costs to vary greatly between hospital districts, also when age, sex and other need criteria are taken into account [2, 3]. The budget can be seen as a primary factor, because it has an important effect on many factors related to service production. A relatively small budget may, for instance, create difficulties in acquiring a sufficient number of skilled personnel and adequate equipment and facilities, and it may hinder the introduction of measures for injury prevention. In practice, large differences have been found in the productivity of hospitals and in the age- and sex-standardized rate of many medical procedures in hospital districts, which in turn may be associated with the occurrence of adverse events [2, 4].

Factors that are influenced by the budget may also have an independent effect of their own. These comprise the number, skills and specialization level of health care personnel, quantity and type of services provided, treatment practices, facilities and equipment, and management and organisation of service production. Further factors may include the overall attitude within a hospital district towards patient safety as well as the activities of the patient ombudsman. The latter, often a nurse or social worker, must by law be available at every hospital and health centre to advise patients on their legal rights and, if necessary, help patients in making a complaint or file a claim.

The number of health care personnel may have a two-way effect: a shortage of personnel may increase the incidence of injuries, because the provision of certain services may require a minimum number of workers to attain a sufficient level of quality. However, a large number of health care personnel may be associated with a high rate of adverse events, because in a large organisation it might be difficult to pass on know-how to all workers and, in general, risks of communication disruptions increase. High competency of health care personnel and the level to which they have specialized are likely to be negatively associated with patient injuries.

A two-way effect may also be seen in regard with the quantity of services provided. Many medical procedures require a minimum number of these to be carried out in a certain stretch of time in order to achieve a sufficient level of quality and to avoid complications. However, an increase in the quantity of services may, after some point, result in an increase in the incidence of injuries, if doctors and nurses have to work at their limits and provide as much as possible.

The type of services provided plays a role in the occurrence of injuries. Complex surgical procedures and other demanding measures, for instance, certain orthopaedic and obstetric treatments, involve an increased risk of injury. An increased risk may also be involved in the diversity of services provided. A provider unit producing a large diversity of services may not obtain such good skills in performing these as a provider unit that focuses its activities on a narrow field of medical procedures.

Different pricing methods create different incentives for the quantity and type of services provided, and in consequence, may affect the rate of injuries to varying extent. Pricing methods

with fee-for-service kind of features are likely to increase the quantity of services and thus are likely to increase the occurrence of patient injuries.

In previous studies, individual risk factors such as patients' high age and complexity of disease have been shown to predispose to adverse events [5, 6]. It is therefore possible that morbidity, demographic and socioeconomic characteristics of a hospital district's population influence the occurrence of injuries. These characteristics are called here external factors.

The above description is a simplified model that almost certainly has not taken into account all possible factors. Moreover, in practice, the occurrence of injuries may often be the result of different events involving organisational and human factors that not necessarily alone but by following one after the other cause an injury [7, 8].

Based on studies in other countries on the epidemiology of adverse events in health care (see for instance, [5, 6]), claims made to the Patient Insurance Centre most likely present only a small part of all patient injuries in health care in Finland. This viewpoint is further supported by other studies, which have found that the majority of adverse events resulting from substandard care (often defined as care that does not achieve the standard of an experienced health professional) do not lead to a malpractice claim, and vice versa, many claims do not involve an injury at all [9, 10]. At the same time, adverse events causing more serious consequences are more likely to lead to a claim than less serious ones [11], and claims involving an injury due to substandard care are more likely to receive compensation than those not involving one [12]. However, since claims made to the Patient Insurance Centre most likely represent at least a share of all patient injuries and since most of the studies mentioned have been carried out in countries with a tort system and such information is not available on Finland, we assume here that factors affecting patient injuries as a whole affect the incidence of claims and compensations, as well.

The Patient Insurance Centre decides whether a claim is compensable or not on the basis of the Patient Injury Act, medical records, expert statements and other necessary documents. Being largely regulated like a public authority, the Centre most likely aims at making compensation decisions as accurately as possible according to law and at treating claims from public and private sectors equally. However, the fact that the Centre is a consortium of private for-profit insurance companies, which finance compensation payments for injuries in the private sector,

might possibly create an incentive for the Centre to minimize compensation payments for injuries also in the public sector.

Benefits of information on claims and compensations

The relationship between municipalities and hospital districts can be viewed as an agency-relationship [13]. Municipalities (principals) have the main responsibility for organising health services. In regard with specialised health care, hospital districts (agents) arrange and develop services as well as take care of their specified obligations regarding research and training of health care personnel on behalf of municipalities. An agency-relationship also exists between municipalities and health centres, since tasks related to the provision of primary care have been delegated to health centres. Within hospital districts, a great deal of decision-making power concerning targets and strategies of specialised health care has been placed within the executive management of hospital districts.

Since municipalities are the owners of hospital districts, each municipality has one or several representatives in the council of its district, the body with the formally ultimate decision-making power. In spite of this, significant asymmetry of information remains between municipalities and hospital districts. The latter are specialist organisations which employ a large number of medical doctors and other health professionals whose expertise about medical and health care greatly exceeds that of municipalities. Moreover, by being closer to patient care, hospital districts have better information about the patients they treat and are in a better position to observe activities at their hospitals and the outcome of these.

To fill the gap in information asymmetry, municipalities must find means to monitor hospital districts' activities and effectiveness of care. Claims made to the Patient Insurance Centre and the result of compensation settlements can act as signals, which indicate that some patient groups have experienced a bad outcome of care or have otherwise been dissatisfied with their treatment. Rates of claims and compensations may also be monitored over time, so that changes in these may reflect a change in performance or quality of care. These kind of signals could be used not only by municipalities but also by national health care decision-makers to initiate improvements in the delivery of health care.

DATA AND METHODS

Variables

We studied the effect of internal and external factors on both the incidence of claims and compensations within hospital districts from 1994 to 2003. Information on claims and compensations for patient injuries occurred in publicly provided primary, specialised, and psychiatric health care within hospital districts were obtained from the Patient Insurance Centre.

Data on total health care costs per 1000 inhabitants within hospital districts were obtained from Statistics on Municipal Finances and Activities, via the SOTKANet –database. These costs comprised municipalities' expenditure on primary, specialised, and psychiatric care and were deflated with the municipal health service price index published by Statistics Finland. Costs were expected to be negatively associated with the incidence of claims and compensations.

The number of doctors per 10 000 inhabitants was collected from Statistics Finland, also via the SOTKANet –database. The number included doctors in primary, specialised, and psychiatric care. As discussed before, the number of doctors was thought to either increase or decrease the incidence of claims and compensations.

Number of admissions to public health care providers per 1000 inhabitants was obtained from the Hospital Discharge Register. Similar to the number of doctors as discussed above, the quantity of services could either increase or decrease the incidence of claims and compensations.

Different pricing methods may not have a strong impact on service provision in Finland, since hospital districts negotiate with their municipalities an annual plan including costs. However, DRGs possess more of fee-for-service kind of features than some other pricing methods such as bed day prices or capitation. We therefore assumed that the utilization of DRGs in invoicing would increase the quantity of services provided, and in consequence, the incidence of claims and compensations. Information on the utilization of DRGs was obtained from previously collected data. Hospital districts that utilised DRGs at least in part in invoicing were given a dummy variable of 1, and those that did not, were given 0.

Orthopaedic procedures as a share of all admissions to the surgery departments of hospital districts were introduced as a measure of the focus of activities within districts. Surgery departments comprised general surgery, orthopaedics, gastroenterological surgery, paediatric surgery, urology, hand surgery, plastic surgery, cardiothoracic surgery, and vascular surgery. Data for the calculation for this variable was retrieved from the Hospital Discharge Register. It was assumed to be positively associated with the incidence of claims and compensations.

The number of persons aged 75 years or more as a share of hospital district's population was obtained from Statistics Finland, also via SOTKANet –database.

A further factor affecting the overall rate of claims being regarded as compensable, is likely to be the number of claims filed. As indicated by Figure 3, an increase in the number of claims filed will probably lead to an increase in claims compensated. We therefore introduced the incidence of claims per inhabitants as an additional explanatory variable when analysing the effect of the independent variables on the incidence of compensations.

Overall, the average incidence of claims in hospital districts grew from 1994 to 2003. The highest value was observable in 1999. A peak in the average incidence of compensations was seen in 1997, where after this variable declined for three years and started growing again but never reached the highest level again. These developments might possibly reflect the change in the Patient Injury Act in 1999 that might have changed the criteria for infections more strict. (Table 1).

Total health care costs within hospital districts grew steadily over the entire study period, whereas the number of doctors fluctuated to some extent. Number of admissions grew until 2000 and then started declining. This probably indicates a change in practice patterns preferring outpatient care. The number of hospital districts utilising DRGs for invoicing, at least in part, grew from zero in 1994 to 8 districts in 2003. At the same time, the number of orthopaedic procedures as a share of all admissions to the surgery department remained around a third. The share of persons aged 75 or more grew over the entire study period. (Table 1)

Table 1. Descriptive statistics – means of the variables from 1994 to 2003.

Variables	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
<u>Dependent variables</u>										
Incidence of claims / 100 000 inhabitants	118.49	116.82	122.79	125.62	125.27	129.78	124.71	120.13	125.38	124.30
Incidence of compensations / 100 000 inhabitants	40.04	38.14	42.71	45.51	44.88	42.09	36.86	38.72	40.71	40.54
<u>Independent variables</u>										
Total health care costs / 1000 inhabitants in euro (deflated)	818.90	817.77	843.88	884.62	881.79	881.79	892.16	932.83	972.03	1014.17
Number of doctors / 10 000 inhabitants	18.12	18.04	18.89	18.84	19.09	19.46	19.48	19.23	19.17	19.28
Number of admissions / 1000 inhabitants	247.86	250.04	263.63	263.14	264.87	265.37	267.40	263.80	262.22	262.33
DRGs (dummy variable 1 if utilised for invoicing)	0.00	0.00	0.00	0.05	0.05	0.05	0.15	0.30	0.35	0.40
Orthopaedic procedures as a share of all admissions to surgery dep.	0.31	0.30	0.30	0.31	0.32	0.32	0.33	0.33	0.33	0.33
Share of persons over 75 years (%)	5.93	6.13	6.29	6.47	6.67	6.89	7.12	7.37	7.57	7.80

Model and estimation techniques

The data consisted of yearly observations for hospital districts as groups from 1994 to 2003, thus comprising panel data. Panel data methods allow to take into account unobservable group and time effects which can otherwise not be included into regression analyses. In this study, unobservable group effects were assumed to be differences between hospital districts in their overall attitude towards patient safety, the management of the districts, differences in the implementation of quality assurance programs and other aspects related to quality and injuries. These were thought to be established practices and characteristics of hospital districts that do not vary over time (time-invariant effects).

Unobservable time effects were assumed to be the same across hospital districts (group invariant effects) and to comprise changes in treatment practices and technological changes such as the shift of care from inpatient to outpatient care, growing use of day-surgery, and changes in the Patient Injury Act in 1999.

The model was as follows:

$$y_{it} = \alpha_0 + \alpha_i + \lambda_i + \beta'X_{it} + \varepsilon_{it} , \text{ where}$$

y_{it} = incidence of claims per 100 000 inhabitants (stage 1)

OR: incidence of compensations per 100 000 inhabitants (stage2)

α_0 = common intercept for all groups (hospital districts)

α_i = group (hospital district) dummy variable

λ_i = year dummy variable

β = coefficient for independent variable

X_{it} = independent variable

ε_{it} = error term

We first tested the effect of the independent variables on the incidence of claims (in stage 2, on the incidence of compensations) with Ordinary Least Squares without hospital district and time effects. We then added hospital district dummy variables, and tested the model both as a one-way fixed effects model (FEM1) and a one-way random effects model (REM1). Finally, we introduced time variables and tested the model as a two-way fixed effects model (FEM2) and a two-way random effects model (REM2).

In the random effects model, the estimation technique utilised is Generalised Least Squares (GLS), whereby group and time effects are transformed into random variables.

RESULTS

In stage 1 (the dependent variable was the incidence of claims), the preferred model was REM1, since time effects were statistically insignificant and the Hausman test favoured REM1 over FEM1 (Table 2). In stage 2 (the dependent variable was the incidence of compensations), the preferred model was REM2, since both group and time effects were statistically significant and the Hausman test favoured REM2 over FEM2 (Table 3).

Functional form of the models was tested by the MacKinnon, White, and Davidson test [14]. It suggested that a log-log form for models in both of the two stages be correct. In consequence, both the dependent and independent variables except for the dummy variable describing utilization of DRGs were transformed to logarithmic.

A Chow test [14] indicated structural stability within the model in stage 1 but not within stage 2. Statistical analyses of the latter were therefore also carried out in two sections, the first covering years from 1994 to 1998 and second from 1999 and 2003 (Table 3). These time periods were chosen on the basis of the Chow test and on the basis of the change in the Patient Injury Act 1 May 1999.

Table 2. Results on the incidence of claims (stage 1).

Variable	REM1 (n=20 t=10) Years 1994-2003	
	Coefficient	p-value
Total health care costs/1000 inhabitants	0.00	0.98
Number of doctors/10000 inhabitants	-0.04	0.71
Number of admissions/1000 inhabitants	0.75	0.00
DRGs utilised for invoicing	0.02	0.48
Orthopaedic procedures as a share of all admissions to surgery dep.	0.28	0.00
Share of persons aged 75 or more	-0.06	0.57
Constant	1.18	0.33
Group effects OLS/FEM1	F(19,174)=17.88	0.00
Time effects FEM1/FEM2	F(9,165)=1.16	0.32
Fixed effects vs. random effects model (Hausman test)	6.08	0.41

Table 3. Results on the incidence of compensations (stage 2).

Variable	REM2 (n=20 t=10) Years 1994-2003		REM1 (n=20 t=5) Years 1994-1998		REM2 (n=20 t=5) Years 1999-2003	
	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
Total health care costs/1000 inhabitants	0.00	0.99	0.34	0.13	0.19	0.45
Number of admissions/1000 inhabitants	0.39	0.00	0.37	0.03	0.35	0.02
DRGs utilised for invoicing	0.01	0.76	0.03	0.77	0.02	0.57
Share of persons aged 75 or more	-0.05	0.58	-0.02	0.89	0.08	0.50
Incidence of claims/100 000 inhabitants	0.97	0.00	0.97	0.00	0.94	0.00
Constant	-3.02	0.01	-5.23	0.00	-4.32	0.01
Group effects OLS/FEM1	F(19,175)=3.71	0.00	F(19,75)=2.01	0.02	F(19,75)=3.10	0.00
Time effects FEM1/FEM2	F(9,166)=4.14	0.00	F(4,71)=1.27	0.29	F(4,71)=3.95	0.01
Fixed effects vs. random effects model (Hausman test)	8.48	0.13	3.17	0.67	6.99	0.22

Table 4. Fit of the models for the incidence of claims and compensations, R-squared.

	Incidence of claims	Incidence of compensations
X-variables	0.37	0.69
Hospital district effects	0.75	0.71
X-variables and hospital district effects	0.79	0.83
X-variables, hospital district- and time effects	0.80	0.86

In stage 1, both the number of admissions per 1000 inhabitants and orthopaedic procedures as a share of all admissions to the surgery department were statistically significant at less than 1% level (Table 2). Based on the estimation results, a 1% increase in the number of admissions increases the incidence of claims by 0.75%, whereas a 1% increase in the share of orthopaedic procedures increases the incidence of claims by 0.28%.

In stage 2, the incidence of claims per inhabitants was statistically significant, implying that a 1% increase in claims results in 0.97% increase in compensated claims (Table 3). Also the number of admissions per 1000 inhabitants was statistically significant at less than 1% level with an elasticity coefficient of 0.39. In estimations of the first and second halves of the ten-year period of time, the elasticity coefficients of these statistically significant variables changed slightly but remained the only statistically significant ones.

The number of doctors was initially included as an independent variable into the model in stage 2. It was statistically significant only in the presence of the incidence of claims –variable, not otherwise (this will be further investigated in the continuation of the study). It was therefore omitted. The share of orthopaedic procedures –variable was also excluded from the model in stage 2. It probably partly overlapped with the incidence of claims, as can be anticipated from the estimation results in stage 1. Moreover, when included into the model in stage 2, it was statistically significant in the absence of the incidence of claims –variable but not in this presence.

The independent x-variables explained almost 40% of the change in the incidence of claims. Adding unknown hospital district effects improved the fit of the model up to 79%. In stage 2, the independent x-variables explained about 70% of the change in the incidence of

compensations. The fit of the model increased up to 86% when unknown hospital district and time effects were added. (Table 4)

DISCUSSION

Patient injuries have been shown to occur relatively frequently in health care, according to some estimates one out of hundred patients admitted for inpatient hospital care suffers from a preventable injury [5, 15]. Nevertheless, there seem to be only a few associations between claims filed for an injury and commonly used measures of health care provision.

The number of admissions per inhabitants was positively associated with a change in the incidence of both claims and compensations. If claims are related to poor quality (in reality, it is not known whether this is the case) and there is a trade-off between quantity and quality of services, as described in health economic literature [16], an increased number of claims and compensations could be the product of this trade-off. For instance, an increase in the number of admissions might entail an increase in very different kinds of services so that an improvement in health professionals' skills and other aspects of service provision required for an improvement in quality and a reduction in injuries is not achieved. However, the positive association between admissions and claims (and compensations) could also simply indicate that the provision of health services will always entail a certain amount of adverse events.

As expected, an increase in the number of orthopaedic procedures as a share of admissions to the surgery department was associated with an increase in the incidence of claims. Orthopaedics represents a medical speciality where patients are known to be more susceptible to adverse events than in many other fields of medicine [6]. Measures for injury prevention may thus be more beneficial in orthopaedics than in other specialities. Also centralising demanding orthopaedic procedures to selected hospitals and hospital districts could diminish the occurrence of patient injuries.

The incidence of claims was a strong predictor of the incidence of compensations implying that the more claims are filed the more compensable injuries are detected. However, it is not known whether a high rate of claims and compensations also signifies a high rate of "true" (i.e. a high total number of) patient injuries. It is also not known whether claims and compensations are in

some way associated with the average or overall quality of care. If health care personnel and patient ombudsmen are open about patient injuries and actively encourage patients to claim, this might result in a high number of claims, and in consequence, a high number of compensated claims. This idea is supported by a previous study on surgical wound infections [17], which found that the rate of compensated claims was higher at hospital with a positive attitude towards filing a claim. Also empirical studies from the United States suggest that an association between malpractice suits and quality of care does not exist [18]. Nevertheless, there is not sufficient empirical evidence as to make any firm conclusions about the association of claims and compensations with the overall incidence of patient injuries or quality of care.

Health care resources as measured in terms of total health care expenditure and the number of doctors as well as invoicing by means of DRGs did not have a statistically significant effect. Changing the amount of resources or financial incentives may thus not straightforwardly affect claims or compensations. The share of elderly was also statistically insignificant indicating that this external factor does not create an extra burden to hospital districts in terms of claiming and compensation payments. It is not possible to conclude though that elderly would have been correctly compensated for injuries.

In a study from the United States [19], one of the most significant factors to explain the rate of malpractice claims was urbanization. We tested population density in this study as an additional explanatory variable but abandoned it because of high correlation between this and several of the other independent variables and because of statistical insignificance.

The independent x-variables explained even 70% in the incidence of compensations. The high share was mostly due to the incidence of claims -variable. Also hospital district effects explained a large part of the variation in the incidence of claims and compensations. Characteristics and practices of hospital districts thus appear to be important factors in determining whether patients file a claim and receive compensation.

When the dependent variable was incidence of compensations, time effects explained a small part of the variation in this variable. This suggests that technological advances and changes in treatment practices as well as changes in the justifications for compensations may have affected chances to receive compensation.

Although there is not sufficient knowledge to relate claims and compensations to the overall rate of patient injuries or quality of care, claims and compensations can act as signals of adverse outcomes experienced by some patient groups. These signals can be utilized to track flaws in treatment processes and to place measures for injury prevention where most worthwhile.

Figure 1. Incidence of claims / 100 000 inhabitants for patient injuries in publicly provided health care within hospital districts from 1994 to 2003, three-year moving average (each curve designates a hospital district).

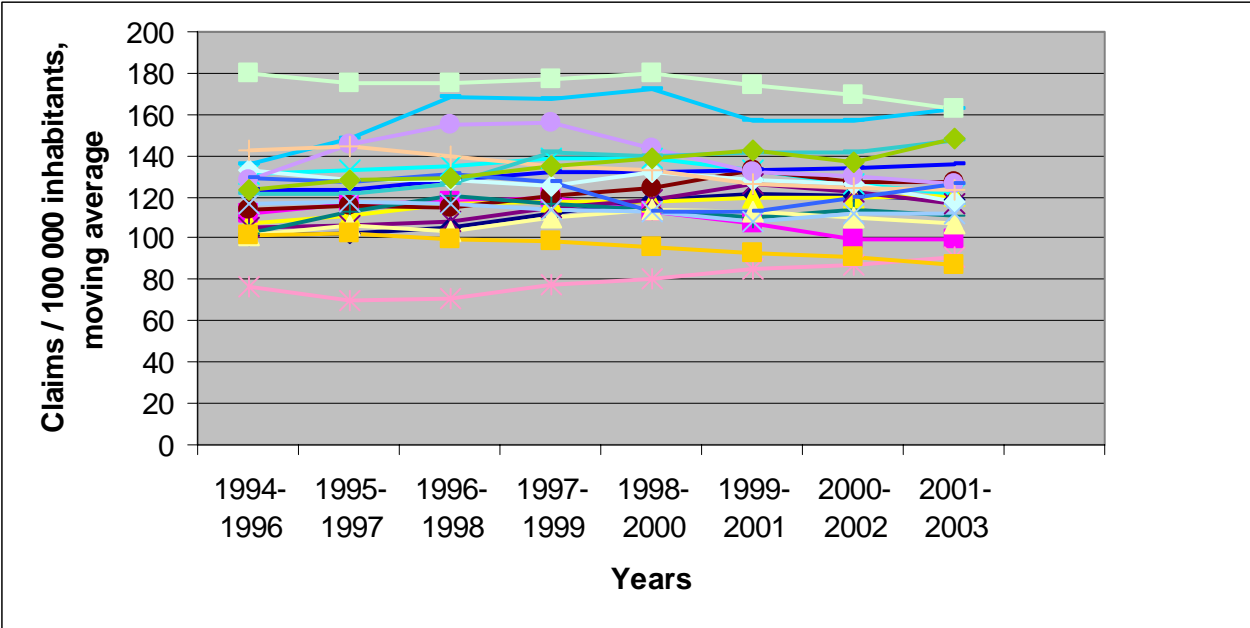


Figure 2. Incidence of compensations / 100 000 inhabitants for patient injuries in publicly provided health care within hospital districts from 1994 to 2003, three-year moving average (each curve designates a hospital district).

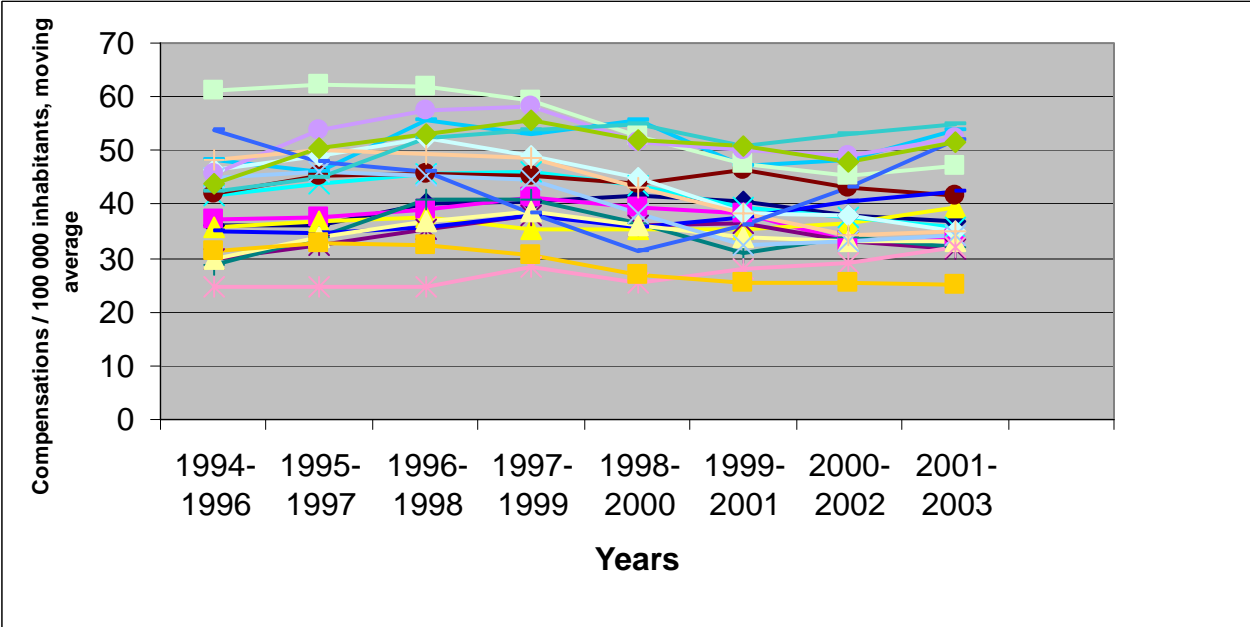
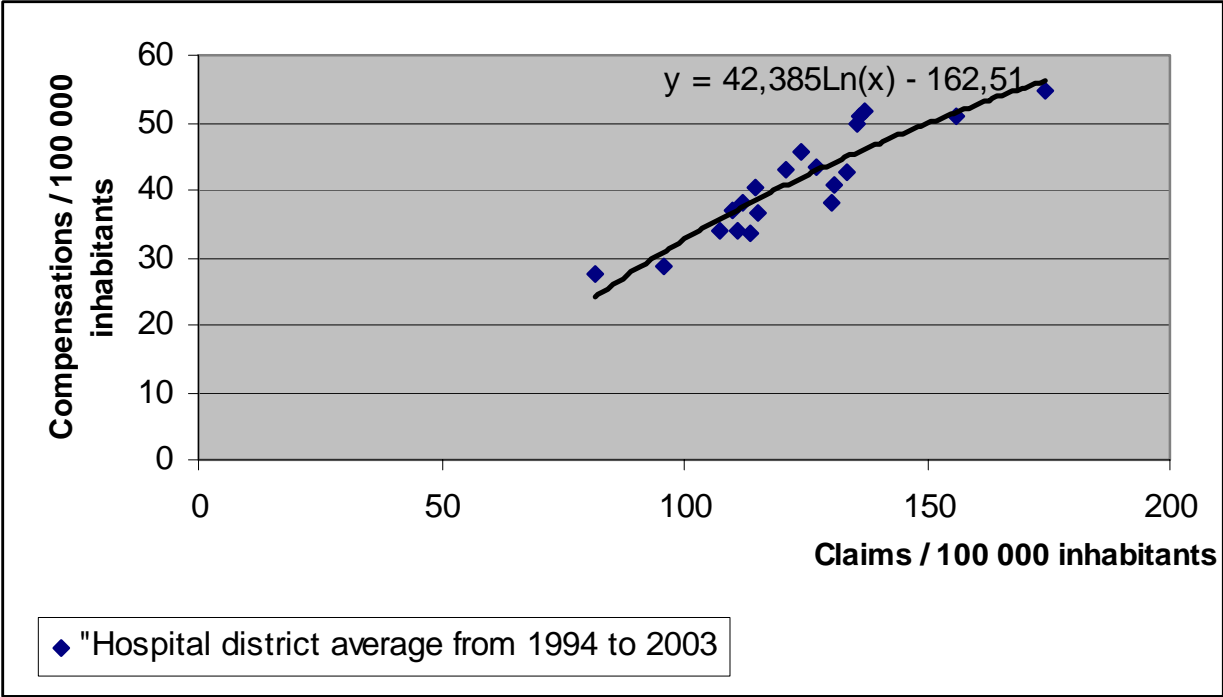


Figure 3. Incidence of claims vs. incidence of compensations (publicly provided health care within hospital districts from 1994 to 2003).



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