Primary Physician Services – List size and Primary Physicians’ Service Production
Jostein Grytten, Dental Faculty, University of Oslo, Oslo*
Rune Sørensen, Norwegian School of Management, Sandvika

Abstract
The regular general practitioner scheme was introduced in Norway in 2001. A patient list system in combination with a partial per capita financing system for primary physician services was then introduced. The focus of this research was to study how the patient list system influences patients’ accessibility to primary physicians, and how the system influences primary physicians’ service production. We studied two possibilities: First, some physicians can have an incentive to acquire a long patient list in order to ensure a high unearned income from per capita payment. This can lead to rationing of consultations. Second, physicians with short lists can have an incentive to increase their service production per consultation in order to compensate for lack of income. This leads to increased costs. The research questions were investigated empirically using two large sets of national data for primary physician services in Norway. Two of the main findings were that long lists do not lead to rationing, and short lists do not increase service production per consultation.

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* Corresponding author. Dental Faculty, University of Oslo, P.O.Box 1052 Blindern, 0316 Oslo, Norway; Tel +47 22 84 03 87; Fax +47 22 84 03 03; e-mail: josteing@odont.uio.no.
1. Introduction

During the last 10-15 years, several western countries have initiated extensive reforms of their health services. This is reflected in the growth of Managed Care in the USA, and in the introduction of internal markets in the National Health Service in Great Britain. Reforms have also been initiated in the Norwegian health services (Ministry of Health and Social Affairs, 1998; Ministry of Health and Social Affairs, 1999; Ministry of Health, 2001). On 1 June 2001, a reform of Norwegian primary physician services also took place. A regular general practitioner scheme was then introduced (Ministry of Health and Social Affairs, 1999).

The overall aim of the reform was to improve the quality of primary physician services. Patients should have better access to physicians and have increased security, primarily by being given a statutory right to be attached to a regular general medical practitioner. Through improved continuity in the relationship between the physician and the patient, it is expected that the physician can do a better job for the patient, with regard to diagnosis, treatment, referral to a specialist or hospital, follow-up and check-up. The means of achieving this was the introduction of the patient list system in combination with partial per capita financing of primary physician services. The patient list system means that primary physicians assume medical responsibility for a well-defined population of patients. As compensation for taking this responsibility, they receive a per capita payment for every patient on their list\(^1\). In the Norwegian regular medical

\(^1\) Before the reform there were two types of primary physician in Norway: contract physicians and salaried physicians. Contract physicians, who made up about 80 % of all primary physicians, had a contract with the municipality to practice. The municipality paid them a fixed grant, which amounted to about 30 % of their income. The rest of their income came from fees per item of treatment (from patient charges and from fee-for-service
practitioner scheme, primary physicians receive NOK 299 per patient on their list. This sum is the same for all primary physicians, irrespective of where they work. The per capita component is meant to make up about 30 % of primary physicians’ income. Nearly all primary physicians in Norway are attached to the scheme.

Thus in primary physician services, such as the Norwegian primary physician service, physicians’ income is largely determined by the list size, and the composition of the patient list. This raises two issues. First, do long patient lists lead to rationing? The regular medical practitioner can have an incentive to ensure that he or she has a long patient list in order to ensure a high unearned income from per capita payments. Second, do short lists lead to a higher service production per consultation? Physicians with short lists can compensate for lack of income by increasing reimbursements per consultation. Rationing means reduced access to primary physician services, while higher service production means increased costs. These are both undesirable effects of the regular general practitioner scheme.

The focus of this article is to study the importance of list size in relation to regular medical practitioners’ service production in Norway. Below, we present a short summary of the relevant international literature, and derive our hypotheses in the light of this literature. One strength of our work is that we

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reimbursements from the National Insurance Administration). The result of the reform for these physicians was primarily that they were given responsibility for a regular patient population. Before the reform, about 20 % of primary physicians were salaried physicians who received a fixed salary from the municipality. The result of the reform for these physicians was that they also were given responsibility for a regular patient population. But for these physicians, the reform led to a significant change in their type of remuneration.
have access to large sets of representative data, which has made it possible to conduct empirical analyses to test our research question. In addition, the study has been carried out within a health system where it has been possible for us to study the effect of list size in isolation. Both the level of the per capita payment and reimbursements are determined centrally through annual negotiations between the State (the Ministry of Labour and Government Administration) and the Norwegian Medical Association (Norwegian Medical Association, 2003). This means that differences in service production between different regular medical practitioners cannot be explained by differences in the level of per capita payments and fees².

2. **Short discussion of the literature and expected effects**

There are relatively few studies in the health economic literature in which the effect of size of patient list on the service production of primary physicians has been studied³. The main focus in much of the existing literature has been on the effects of different types of remuneration system on effectiveness and quality in primary physician services and specialist health services (for a review see Dranove and Satterthwaite, 2000; Robinson, 2001). An important research question has been how much of primary physicians’ income should come from per capita remuneration, in relation to fee-for-service remuneration at the level

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² For example, in the extensive literature on supplier induced demand, distinguishing between pure demand effects and supply effects has been a problem in studies where physicians’ fees vary (for example see: Auster and Oaxaca, 1981; Dranove and Wehner, 1994; Ramsey and Wasow, 1986; Reinhardt, 1978).

³ Extensive community medicine research is to be found, that emphasises the importance of having a patient list system (for example see: Baker and Streatfield, 1995; Hjortdahl, 1992; Ettner, 1999; Donaldson, 2001). The results of this research show that with a patient list system primary physicians get to know their patients better, which in turn leads to improved quality of the medical service that is offered.
of the procedure (Robinson, 2001; Hellinger, 1996; Selden, 1990; Ellis and McGuire, 1990; Newhouse, 1996; Prendergast, 1999). According to theory, a large component of per capita remuneration will promote effectiveness. However, this can occur at the expense of the quality of the medical service that is provided. In addition, patient selection can be a problem (Luft and Miller, 1988; Van de Ven and Van Vliet, 1992; Newhouse, 1994).

The weakness of a high proportion of fee-for-service remuneration is that it can lead to poor cost control, with subsequent low cost-effectiveness (Prendergast, 1999). This may particularly be the case if competition leads to a lack of patients. Within a fee-for-service remuneration system physicians have the possibility to compensate for a lack of patients by providing more services per consultation. In that way they can maintain a high level of income even though the number of patients falls as a result of increased competition (for example if physician density within an area increases). This mechanism, in which physicians can use their market power to increase demand for their service is often referred to as supplier induced demand.

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4 We expect patient selection to be less of a problem under the regular general practitioner scheme. First, the level of per capita payments is low in relation to the payments that physicians receive from fee-for-service remuneration. Second primary physicians cannot decide themselves which patients are allocated to their list. Inhabitants report to the local national insurance office which physician they wish to have. There are 434 municipalities in Norway, with one national insurance office in each municipality. The local national insurance offices allocate patients to regular medical practitioners according to the wishes of the patients.

5 There is a comprehensive international literature on supplier inducement. The prevailing opinion in the 1970s and 1980s was that physicians induced demand for their services (for a review see Feldman and Sloan, 1998; Rice and Labelle, 1989). However, at the end of the 1980s the picture became more balanced, primarily because the methodology for studying inducement greatly improved. Studies carried out during the last ten years have not found so much evidence of supplier inducement (for examples see Keeler and Fok, 1996; Stano, 1985; Dranove and Wehner, 1994; Carlsen and Grytten, 1998; Davis et al., 2000).
In the Norwegian regular medical practitioner scheme, primary physicians receive a relatively large proportion of their income from fee-for-service payments. This indicates that there may be a problem with cost control, in particular with respect to those physicians who have a shorter list than they wish. These physicians can be tempted to take more laboratory tests and/or provide more treatment than necessary in order to ensure a certain level of income.

An analysis of the relationship between list size and physicians’ service production can illuminate whether the regular medical practitioner reform has led to increased costs. In such an analysis it is also important to take into account that some physicians have long lists, and hence they may ration their services. We distinguish between effects on consultations and effects on reimbursements per consultation. Given that inducement or rationing does not occur, we expect that the number of consultations per physician increases in proportion to list size, that is to say that access for the individual patient is independent of list size (Figure 1)\(^6\). This represents an elasticity of 1. The number of consultations per patient on the list will then be independent of list size.

An elasticity lower than one can be interpreted both as rationing and inducement. For example, if we observe that a reduction of 1 % in the number of patients on the list only leads to 0.8 % fewer consultations, then the explanation can be inducement. The physician reduces the supply less than the reduction in the number of patients on the list indicates. But an elasticity of

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\(^6\) This is formally derived in our earlier work, for example see: Carlsen and Grytten, 1998; Sørensen and Grytten, 1999.
0.8% can also be the result of rationing (Carlsen and Grytten, 1998; Sørensen and Grytten, 1999). An increase of 1% in the number of patients on the list only leads to an increase of 0.8% in the number of consultations. Of course, it is most likely that we have inducement when the patient list is particularly short, and that we have rationing when it is long. Thus a possible hypothesis is that there is a non-linear relationship, as illustrated in Figure 1.

There is little probability that rationing will occur with respect to reimbursements per consultation. To reduce the desired or actual treatment is not in line with medical ethics or professional norms. In the meeting with the individual patient it is most unlikely that the physician will cut down on treatment. The time costs of many types of treatment are also often low, particularly for taking laboratory tests. When the patient has first entered the physician’s surgery, only marginal time gains can be obtained by rationing these types of service. The patient also has clear rights, and only if to avoid complaints, the physician is unlikely to cut down on necessary treatment.

In principle therefore we can envisage three regimes for consultations (Figure 1): An optimal list size where there is neither rationing nor inducement. For physicians with short patient lists we can envisage a regime with inducement, and for physicians with long lists we can envisage a regime with rationing. For reimbursements per consultation we can envisage two regimes: an optimal list size where there is neither rationing nor inducement, and a regime where there is inducement.
3. Data and methods

The study is based on data collected from two sources: an extensive questionnaire survey of Norwegian primary physicians and data from the National Insurance Administration. By using two sets of data, which were collected in different ways, the robustness of our results could be tested. A short description of the data is given below.

3.1. The questionnaire survey of primary physicians

In the autumn of 2002 an extensive questionnaire survey of all Norwegian regular medical practitioners was carried out\(^7\). The questionnaires were sent out to all the 3 355 regular medical practitioners. Sixty-seven questionnaires were returned unopened. 2 306 regular medical practitioners answered the questionnaire. This represents a response rate of 70 %. An analysis of the non-responders showed that the material was representative of the population of primary physicians with respect to gender, age, place of residence and list size (Grytten et al., 2003). The questionnaire contained questions about service production (number of consultations per physician per year, number of laboratory tests per year)\(^8\) and list size. In addition we collected information about the characteristics of the patients on the regular medical practitioner’s patient list (age and gender), and characteristics of the physician (age and gender).

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\(^7\) The questionnaire survey was a joint project with the Norwegian School of Management, Oslo University and the Norwegian Medical Association’s Research Institute. The survey was administered and carried out by the Norwegian Medical Association’s Research Institute.

\(^8\) The registrations were carried out in a representative week. Figures for the whole year were calculated by multiplying the number of consultations and the number of laboratory tests per week with the number of working weeks per year.
3.2 Data from the National Insurance Administration

These data were obtained from the National Insurance Administration in October and November 2001. The data have detailed information on number of consultations, and type and cost of services provided by regular medical practitioners. The services provided by primary physicians can be classified as: laboratory tests, consultations lasting over twenty minutes and specific procedures. Laboratory tests are used for diagnostic purposes, while specific procedures are items of treatment. Regular medical practitioners can use consultations lasting over twenty minutes for both diagnosis and treatment.

Data from the National Insurance Administration provide information about the costs per consultation for laboratory tests, consultations lasting over twenty minutes and specific procedures. This set of data therefore supplements the data from the questionnaire survey of primary physicians, which only provided information on number of laboratory tests per consultation.

In addition, there is information on the physicians’ gender, age, whether the regular medical practitioner is a specialist in general practice or not, and whether the regular medical practitioner works in a group practice or not. The Norwegian Social Science Data Services has information about list size, which we merged with data from the National Insurance Administration. We also merged data on gender and age for all the patients on each individual regular medical practitioner’s patient list.

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9 Since fees are identical for all regular medical practitioners, revenue from treatment items per consultation is proportional to the total number of treatment items.
The National Insurance Administration obtains its data primarily for administrative purposes. The data are used to monitor physicians’ activities, treatment patterns and level of expenses (Økonomi og Helse, 1997). The information is collected for one month: i.e. the content of all patient consultations during one month is registered on data. All regular medical practitioners in Norway have to participate in this registration. However, the National Insurance Administration only makes data from a sample of the physicians available for research. Our sample includes 1 637 primary physicians, with 434 000 consultations altogether. This material is representative for the total population of primary physicians in Norway (Grytten et al., 2003).

3.3 Regression model

We specify a simple regression model:

\[ Y_{kj} = \text{Constant}^k + \beta_1^k \text{List size}_j + \beta_2^k \text{Too much}_j + \beta_3^k \text{Too little}_j + \text{Control variables}_j + \text{Error term}^k \]  

(1)

where \( k \) represents type of service, and \( j \) is an index for physicians. From the questionnaire survey of primary physicians we ran a regression model with the following types of service as dependent variables: number of consultations per physician, number of physician-initiated consultations per physician and number of laboratory tests per consultation per physician. With the data from the National Insurance Administration, the model was run with number of consultations per physician, and reimbursements per consultation per physician as dependent variables.
The regression coefficient $\beta_1$ (equation 1) expresses the effect of list size. In the absence of rationing and inducement we expect that it is equal to 1 in the analyses with consultations as dependent variables. In the analyses with number of laboratory tests per consultation per physician, and reimbursements per consultation per physician, we expect that $\beta_1$ is equal to 0 if there is no inducement.

One methodological problem remains: what is the direction of the causal effect between list size and service production? We want to examine the effect of list size on service production. But there is also reason to believe that list size is determined by patients’ expected service needs, that is that list size is adapted to patient morbidity. In that case the number of consultations determines the list size. We may therefore observe that physicians with short patient lists have relatively many consultations per patient on their list (a high level of morbidity), whilst physicians with long patient lists have relatively few consultations per patient (a low level of morbidity). Thus the estimated elasticity for list size per consultation per physician will be lower than 1, which may be an indication of rationing or inducement, if we do not take into account the effect that morbidity has on the list size.

The potential endogenicity of list size is dealt with using two-stage least square estimation and the use of instrument variables. In the first step, a model is estimated with list size as dependent variable, and a set of instrument variables that are highly correlated with list size, but not with the error term in the primary regression. We use municipal income per inhabitant, population and
demographic characteristics as instruments. These are factors that define the framework for the decisions taken by the municipalities about the number of regular medical practitioners in the municipality. At the same time, the size of these factors are outside the control and influence of the individual physicians. We do not use physician density in the municipality as an instrument because this can be endogenous – influenced by morbidity in the municipality. In the second step we use predicted list size as an independent (and exogenous) variable in the regression where we analyse physicians’ consultations and income from reimbursements per consultation.

In the regression model (equation 1) we have included two dummy variables that express to what extent regular medical practitioners have too many or too few patients on their list. In an earlier study of primary physician services in Norway, it was found that the physicians who reported that they had fewer patients on their list than they wished to have, recalled their patients more often than physicians who reported that they had an adequate number of patients (Iversen and Lurås, 1998). The study was carried out on a relatively small sample of 105 regular medical practitioners in four municipalities. These municipalities had a pilot project with a regular medical practitioner scheme from 1994-95 (Iversen and Lurås, 1998). With our data it has been possible to check the results of the pilot project using a larger and more representative sample. If the regression coefficient $\beta_2$ (equation 1) is negative, this means that physicians who experience that their workload is too great ration their service production$^{10}$. Correspondingly, a positive $\beta_3$ can be interpreted as indicating

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$^{10}$ In the questionnaire survey of primary physicians we asked the following question: "Based on an overall evaluation of economy, workload and other personal factors is the number of
that physicians who report that they have too few patients on their list compensate for the lack of patients by increasing their service production. A plausible explanation is that they do this in order to increase their income.

To control for variation in demand for primary physician services, the distributions of patients according to gender and age were included as control variables. Supply of services varies according to characteristics of the physician and the practice. Therefore, physicians’ gender and age, whether they have a specialist degree in general medicine and whether they work in a group practice were also included as control variables.

4. Results

4.1. Rationing or inducement of consultations

Table 1 shows the effect of list size on the number of consultations per physician. The analyses were carried out on data from the questionnaire survey of primary physicians in 2002. In the ordinary least square regression analysis (OLS), the elasticity is 0.823\textsuperscript{11}, which can indicate that regular medical practitioners either induce or ration consultations. When we use instrument variables for list size, the elasticity increases to 0.939\textsuperscript{12}, that is to say that there is an almost proportional relationship between list size and number of

\textsuperscript{11} The confidence interval is (0.77 – 0.88); that is, it does not include 1.

\textsuperscript{12} The confidence interval is (0.76 – 1.12); that is, it includes 1.
consultations per physician. That the elasticity increases when the instrument is used, supports our assumption that regular medical practitioners also take account of characteristics of the patient population when they decide on the length of their list. This seems reasonable, since unobservable morbidity has a negative effect on list size and a positive effect on consultations. Our results give reason to conclude that regular medical practitioners neither induce nor ration consultations.

In the last two columns in Table 1, we have included two new variables. The first variable denotes to what extent regular medical practitioners report that they have too much to do, the other variable denotes to what extent regular medical practitioners report that they have too little to do. 21 % of regular medical practitioners report that they wish to have more patients on their list (Grytten et al., 2003). Correspondingly, 19 % report that they wish to have fewer patients on their list. In the regression in which list size is estimated without instrument variables (OLS), wanting more patients has a positive but weak effect on number of consultations per physician. Interpreted literally, this means that physicians who report that they have too little to do compensate by having 6 % more consultations than regular medical practitioners who report that they have an adequate number of patients on their list. In practice, this represents few consultations in relation to the total number of consultations that each of these physicians have\(^\text{13}\).

\(^{13}\) 21 % of regular medical practitioners report that they wish to have more patients on their list. These physicians have a mean of 3 414 consultations per year: 6 % represents approximately 200 consultations “too many”.
The result is weakened by studying the regression in which the list size with instrument variables is included as a control variable (Table 1, last column). Wanting more patients on the list has a negative and weak effect on number of consultations per physician (regression coefficient = -0.063). The physicians who report that they wish to have more patients on their list have fewer consultations than the regular medical practitioners who report that they have an adequate number of patients. The result of this regression seems reasonable, not least in the light of the argument given above, that instrument variables should be used for list size. The physicians who report that they want fewer patients also have more consultations (regression coefficient = 0.074). This is also a reasonable result.

In Table 2 we present another test for the inducement hypothesis. The analyses were also carried out using data from the survey of primary physicians in 2002. The dependent variable is number of physician-initiated consultations per physician. If physicians induce, we would expect to find that physicians with short patient lists recall their patients more than physicians with long patient

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An explanation of these results is as follows: In the normal regression without instrument variables (Table 1, column 4), the variables list size and wants fewer/wants more patients, capture both the demand effects and the supply effects. List size captures much of the demand side effect (regression coefficient < 1), whilst wants more patients mainly captures the supply side effect (positive regression coefficient). The physicians report that they want more patients, and they compensate for this by doing a little more for each individual patient.

When we use instrument variables for list size (Table 1, column 5), the whole of the supply side effect is captured by the predicted list size. The variable wants more patients on the list, now reflects the demand side effect (negative regression coefficient). The physicians report that they have too little to do, which is realistic, as they also report fewer consultations compared with the physicians who have an adequate amount of work to do. The results can be interpreted as follows: that the physicians adapt to the demand – they do not compensate for lack of patients by increasing the number of consultations.
lists\textsuperscript{15}. We did not find that this was the case. With respect to the effect of list size on the number of physician-initiated consultations, the results are in agreement with the effect of list size shown in Table 1: the elasticity increases when the instrument variable is used for list size. We interpret an elasticity of 0.985\textsuperscript{16} as meaning that the number of recalls per patient on the list is independent of whether the list is long or short.

We have also included variables in Table 2 that capture the extent to which regular medical practitioners want fewer or more patients on their list. The physicians who reported that they wanted more, also had fewer recalls compared with the physicians who reported that the length of their patient list was adequate (Table 2, fifth column: regression coefficient -0.126). This is also a result that weakens the inducement hypothesis. If physicians who report that they have too few patients really do induce, we would expect to find an inducement effect for physician-initiated consultations.

In Table 3 we have analysed data from the National Insurance Administration from the autumn of 2001. The dependent variable is number of consultations per physician. When the instrument variables are used for list size, the elasticity is 0.972\textsuperscript{17}. This elasticity is almost identical with the one we found in Table 1, where the analyses were carried out on the set of data from the questionnaire

\textsuperscript{15} A similar test has been done using data with patients as the unit of analysis in studies from the USA (Rossiter and Wilensky, 1984), from Ireland (Tussing, 1983) and from Norway (Grytten et al., 1995b). In the Irish study it was found that increased competition for patients led to more recalls. This was not found in the Norwegian study, whilst the American study found a weak effect of increased competition on the number of recalls.

\textsuperscript{16} The confidence interval is (0.68 – 1.29): that is it includes 1.

\textsuperscript{17} The confidence interval is (0.67 – 1.27): that is it includes 1.
survey of primary physicians in 2002. Further, the variable measuring whether the regular medical practitioners want more patients has a negative effect on the number of consultations (Table 3: last column). We obtain almost identical results from two different sets of data. This strengthens our conclusion that regular medical practitioners neither induce nor ration consultations.

4.2. *Rationing or inducement of laboratory tests and reimbursements*

In Table 4 we study the effects of list size on the number of laboratory tests per consultation per regular medical practitioner. The set of data is from the survey of primary physicians from 2002. We find a weak positive effect of list size on the number of laboratory tests per consultation. This indicates that regular medical practitioners with long patient lists take a few more laboratory tests than physicians with short lists. The regression coefficients are almost the same size, both with normal regression and when instrument variables for list size are used. However, in the analysis with instrument variables, the coefficient is not statistically significant at the conventional level (p<0.05). In the case of inducement, we would have expected the regression coefficient to be negative. This result weakens the inducement hypothesis: physicians with short lists do not take more laboratory tests per consultation in order to increase their income\(^\text{18}\).

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\(^{18}\) To the extent that one wishes to attach importance to the positive effect of list size, it probably reflects differences in practice profile. Physicians with long lists probably have more equipment, and carry out more advanced diagnostic procedures and treatment, compared with physicians with short lists. This may be because they have worked for the longest time in the municipality, and therefore have most patients with chronic illnesses on their list. It can be profitable to invest in expensive and advanced equipment for taking laboratory tests if one has many patients in the practice.
In the analyses in Table 4, we have also included to what extent physicians report that they want more or fewer patients on their list or not. The regression coefficients are negative and low. This finding does not support the inducement hypothesis: regular medical practitioners who report that they want more patients do not compensate by taking more laboratory tests per consultation. The reverse is actually the case: these physicians take fewer laboratory tests per consultation.

One short-coming of the analyses in Table 4 is that they only include laboratory tests. Physicians with short lists can compensate, for example, by using the fee for a consultation lasting more than twenty minutes more often, or by carrying out other types of treatment more often. We have therefore tested the robustness of the results in Table 4 with analyses of data from the National Insurance Administration from the autumn of 2001 (Table 5). The dependent variable is now reimbursements per consultation per physician. These are reimbursements from the National Insurance Scheme that regular medical practitioners receive for taking laboratory tests, having consultation lasting more than twenty minutes, and for carrying out specific procedures. When instrument variables are used for list size, the regression coefficient is 0.217. This effect of list size is almost identical with the effect from the regression based on data from the survey of primary physicians in 2002 (Table 4). Further, the variable measuring whether the regular medical practitioners want more patients on their list is small, negative and not statistically significant at conventional levels (Table 5: last column). Again, that we find almost identical results from two different sets of data strengthens our conclusion that regular medical practitioners do not induce laboratory tests or reimbursements.
5. Discussion

When the regular medical practitioner scheme was introduced in Norway, there was much discussion about the length of physicians’ patient lists, more specifically whether long patient lists would lead to a primary physician service of poorer quality (Holterman, 2002; Hasvold, 2000). In this study we have illuminated one aspect of quality, that is access. Our analyses indicate that patients’ access to primary physician services is independent of list size.

This finding requires two comments. First, one explanation can be the actual financing system. The per capita component makes up a relatively small proportion of the income of regular medical practitioners in Norway. This gives physicians an incentive to have short lists, which is compatible with good access. Second, even if the mean list size is relatively short, there is large variation in list size between regular medical practitioners (Grytten et al., 2003)\(^6\). However, even physicians who have long lists do not seem to ration consultations. One explanation is that this has to do with practice organization. Physicians with long patient lists probably have effective routines for dealing with patients and with patient flow. Effective practice organization then becomes an important means of ensuring patient access to primary physician services.

A potential disadvantage of the Norwegian financing system is the high proportion of fee-for-service. This can encourage physicians to induce supply

\(^6\) Each regular medical practitioner has a mean of 1 281 patients on his or her list. 18 % of physicians have lists with over 1 600 patients. 9 % of physicians have lists with under 800 patients (Grytten et al., 2003).
by recalling patients too often, and/or by taking too many laboratory tests or carrying out too many procedures. It is reasonable to assume that the tendency to induce is greatest for the physicians who have short lists. We tested for inducement in several ways. First we used several different measures of service production (consultations, recalls, laboratory tests per consultation and reimbursements per consultation). We then carried out analyses on two independent sets of data (a survey of primary physicians and register data from the National Insurance Administration on regular medical practitioners’ actual service production). We obtained consistent results from all the analyses. None of the findings supported the inducement hypothesis. One explanation may be that the physicians who have short lists have chosen this themselves. Therefore they have no need to induce. Another explanation may be that physicians are guided by professional ethical and medical norms, and that they do not allow consideration of “own greed” to influence their service production (Hausman and Le Grand, 1999; Haskell, 1997). This finding is consistent with our earlier research from primary physician services in Norway and other international research from the last 10-15 years (Keeler and Fok, 1996; Sørensen and Grytten, 1999; Grytten et al., 2001; Stano, 1985; Dranove and Wehner, 1994; Carlsen and Grytten, 1998; Grytten and Sørensen, 2001; Davis et al., 2000; Carlsen and Grytten, 2000; Carlsen et al., 2003).

Most of the effects of the control variables were as expected. Nearly 80% of primary care physicians in Norway are men. Male physicians have more consultations than female physicians. This finding is supported by results from previous studies (Langwell, 1982; Mitchell, 1984). Female physicians in Norway have a lower number of consultations because they have shorter
working hours than their male colleagues. Male physicians work on average 42 hours a week in practice compared to 37 hours for female physicians (Johnsen and Holte Dahl, 1997). The number of consultations increases as the proportion of female patients on the list increases. This finding is also consistent with the results from other studies from Norway, where it has been found that women visit the physician more often than men (Grytten et al., 1995b; Paulsen, 1995). Specialists in general medicine have significantly more consultations than non-specialists. This is likely to reflect the fact that specialists have higher preferences for working hours and income than non-specialists.

The focus of this article has been to study the relationship between list size and access. However, access is not the only aspect of quality that is important when evaluating the effect of list size. Time spent with the physician is likely to influence patient satisfaction with primary physician services. It is natural to expect that the Norwegian regular medical practitioners who have long lists spend a shorter time per consultation than regular medical practitioners with long lists. An important question is to what degree this affects the quality of the service provided and patient satisfaction with the consultation. In order to draw conclusions about the relationship between list size, time per consultation and quality of the service, more detailed data on patients and their health status is needed. The most appropriate data would be detailed data at the level of the patient that can be merged with data at the level of the physician. Information about patients (for example different measures of satisfaction and medical

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20 It is not possible with our data to estimate the relationship between list size and time per consultation, since in both sets of data we lack information about the total time regular medical practitioners use on consultations.
needs) could then be merged with information about physicians’ practice (for example time per consultation and list size).

6. Conclusion
There is substantial variation in list size among Norwegian regular medical practitioners. However, this variation does not influence access to regular medical practitioners. Regular medical practitioners with short lists, or those who lack patients, do not recall patients more often, neither do they take more laboratory tests nor carry out more treatment procedures in order to increase their income. We cannot exclude the possibility that regular medical practitioners with long lists spend shorter time per consultation. Whether this influences the quality of the service that is offered and patient satisfaction remains to be seen.

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References


Iversen, T., Lurås, H., 1998. The impact of economic motives on the provision of


norske lægeforening 115, 2797-2800.


