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NORWEGIAN PRIORITY GUIDELINES: ESTIMATING THE DISTRIBUTIONAL IMPLICATIONS ACROSS AGE, GENDER AND SES

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Norwegian priority guidelines: Estimating the distributional implications across age, gender and SES [*]

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Abstract

Objective: Targeting hospital treatment at patients with high priority would seem to be a natural policy response to the growing gap between what can be done and what can be financed in the specialist health care sector. The paper examines the distributional consequences of this policy.

Method: 450 000 elective patients are allocated to priority groups on the basis of medical guidelines developed by one of the regional health authorities in Norway. Probit models are estimated explaining priority status as a function of age, gender and socioeconomic status.

Results: Women and older people are overrepresented among patients with low priority. Conditional on age, women with low priority have lower income and less education than women with high priority. Among men below 50 years, patients with low priority have less education than patients with high priority.

Conclusion: Targeting hospital treatment at patients with high priority, though sensible from a pure medical perspective, may have undesirable distributional consequences.

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1. Introduction

A distinguishing feature of a public health care sector is limited availability of resources. The government or other public bodies decide on total capacity in terms of given budgets. Access to care is free for patients, or they face a low copayment only. Demand is then at any given moment in time likely to exceed supply in terms of short run treatment capacity. The basic reason for this is that patients are not rationed by price. Instead there are waiting lists. Health care providers will then have to make decisions on which patients and diagnoses to be given treatment, and in which order.

Some countries have explicit waiting-time prioritization for certain types of treatments [1,2]. Examples include Sweden, Spain, Italy, Australia, New Zealand, Canada, Denmark and Norway. In some of these counties, prioritization schemes have a limited number of categories; high and low priority in Denmark, Sweden, and Spain; recommended admission within 30 days, 90 days, and one year in Australia and Italy. Other countries have developed systems where patients receive points, and patients with higher scores should have shorter waiting times (New Zealand and Canada). In England, an elective surgery waiting time target was introduced in 2000 [3]. The target has been progressively reduced from 18 months in March 2000 to the current 18 weeks target[1].

Targeting hospital treatment at patients with high priority would seem to be a natural policy response to the growing gap between what can be done and what can be financed in the specialist health care sector. The question we ask in this paper is if this policy may conflict other important health policy goals.

Waiting times and waiting lists give reasons for concern since one often observe differences in patients' waiting times. This may indicate violation of principles of horizontal equity and equal access. Furthermore, if observed waiting times differs across

[1] http://www.18weeks.nhs.uk/

patient groups, the principle of vertical equity may be violated. In many countries, violations of the principles of horizontal and vertical equity are politically unacceptable.

That waiting times are affected by socioeconomic status, are documented by [4-6]. The first of these studies uses data from the Survey of Health, Aging and Retirement in Europe (SHARE). The authors show that patients with higher socioeconomic statues, measured by educational levels, experience lower waiting time for specialist consultations in Spain, Italy and France. For non-emergency surgery, they also find evidence of a negative and significant association between education and waiting times in Denmark, the Netherlands and Sweden. The second paper uses administrative data from England. Socioeconomic status is measured by small area level income and skill deprivation. The authors find that waiting times differ among NHS patients from areas with different socioeconomic status, favoring patients with higher status. The third paper considers the effect of neighborhood income on access to invasive cardiac procedures and on mortality one year after acute myocardial infarction in Ontario, Canada. The study cohort consisted of about 52 000 patients. With respect to coronary angiography, increases in neighborhood income from the lowest to the highest income quintile were associated with a 23 percent increase in rates of use and a 45 percent decrease in waiting time. There was a strong inverse relationship between income and mortality at one year (significant at 1 percent level).

From the empirical literature of health care utilization we also know that richer and higher educated individuals tend to use more specialized health care, conditional on need and non-need factors [7-9]. We do not however know of any study that analyzes how the policy of targeting hospital treatment at patients with high priority affects access to specialized health care across age, gender and socioeconomic status. This is the purpose of the current study. More specifically we examine the following question.

Suppose that health authorities decide that, e.g. in order to contain spending pressure and prevent waiting lists from soaring, some patients groups should not to be offered treatment in hospitals. Are the patients that will be excluded from treatment different from other elective patients with respect to age, gender and socioeconomic status? If the answer to the question is yes, cutback of certain hospital treatments, though sensible from a pure medical perspective, may nevertheless have distributional consequences that are unacceptable to society.

Studies of waiting times and use of specialized care indicate that individuals with higher socioeconomic status have better access, so it might be that individuals with lower socioeconomic status will benefit in relative terms from the above mentioned policy. But prioritization guidelines will also manifest norms that are influenced by public debate and political processes. Since resourceful groups probably have stronger influence on these processes, it might be that the policy mostly will benefit the resourceful groups.

We find that women and older people are overrepresented among patients with low priority. Conditional on age and gender, women with low priority have lower income and less education than women with high priority. For men below 50 years, patients with low priority have less education than patients with high priority.

The rest of the paper is organized as follows. The next section describes the Norwegian specialist health care sector. In section 3 we present the data and the methodology, while section 4 contains the empirical analysis. Section 5 offers discussion and concluding remarks.

2. Institutional features

The Norwegian specialized health care sector is predominantly publicly owned, and as of 2002 organized as state owned enterprises within five (north, mid, west, south, east) regional health authorities (RHAs). The RHAs have the responsibility for providing specialist health care to all patients within the region. The RHAs receive an annual budget from the Norwegian Government, based on a weighted capitation formula. In addition, the RHAs receive an activity-based grant which size is proportional to the number and composition of hospital treatments [10]. The activity-based component is about 40 % of the somatic budget.

Provision of specialist health care is organized through health enterprises (hospitals) owned and governed by the RHAs. These organizations can also contract with private suppliers for providing treatment. This outsourcing is in effect quite small compared to the overall treatment activity, and confined to a few diagnoses. Patients are free to choose hospital at the national level, but few patients receive treatment outside of the hospitals' natural catchment areas.[2]

With the exception of acute care patients, patients are referred to further treatment from a primary care physician. Thus, there is a gate-keeper system regulating access to planned treatment. The 'Act on Patients' Rights' and corresponding administrative regulations determine the rule for prioritization of referred elective patients [14-15]. When receiving a referral, within 30 days the hospital has to consider whether the patient should be given treatment and whether the patient should be allocated to priority group 2 (with a legal right to treatment) or to priority group 3 (without the legal right to treatment).[3] Each patient must be considered according to three criteria: the seriousness of the condition, whether a suitable treatment exists that may improve the patient's condition, and the cost-effectiveness of this treatment. Short run capacity for treatment or demographic and socioeconomic characteristics of the patients should not be taken into consideration. Hospitals are required to offer treatment to patients in group 2 but not to patients in group 3.

There exists no official operationalization of the prioritization rule which assigns elective patients to priority groups. Two regional health authorities have completed projects that evaluate medical conditions on the criteria of the prioritization rule, and the Norwegian Directorate of Social and Health Affairs has initiated a national project with the same

[2] [11-13] provide for more detailed descriptions of the Norwegian hospital sector and the 2002-reform where hospital ownership was transferred from the county councils to the central government.
[3] Acute care patients are allocated into priority group 1.

purpose.[4] The guidelines developed typically include a description of medical conditions, and based on this a recommendation of treatment status, including an allocation of patients onto group 2 (with a legal right to treatment) or 3 (without a legal right to treatment).

It is likely that these projects will affect the prioritization practices of hospitals. In this work we classify elective patients according to the prioritization guidelines developed by one of the regional health authorities, Health Region West. Health Region West has about 22 % of the population in Norway.[5]

3. Data and methodology

To explore differences between elective patients in groups 2 and 3, we merge three data sets. The first data set is the Norwegian Patient Register (NPR) for the period 2004-05. This register contains information about the patient's age, gender, place of residence, length of stay and main and secondary diagnoses for all inpatient acute and elective treatment in somatic hospitals.[6] As the National Patient Register does not have complete data about outpatient treatment, we confine our analysis to inpatient treatment.

The second dataset is the medical guidelines of Health Region West. The guidelines cover 21 medical specialties, and based on descriptions of medical conditions, patients' prioritization status are indicated. The medical guidelines do not contain any ICD-10 coding, which is necessary for tracking patients in official registers. However, with assistance from the medical profession, we were able to map most ICD-10 codes into medical conditions.[7] We restrict the analysis to patients with surgical procedures as the mapping between ICD-10 codes and descriptions of medical conditions turned out to be relatively straightforward for surgical procedures but less so for medical procedures. Our

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[4] The project is still ongoing, October 2009.

[5] A potential problem is that medical guidelines developed in one health region might be affected by access to medical staff and medical equipment (capacity constraints), and that capacity constraints vary systematically among regions. However, a study documented in [16] suggested that capacity constraints were not taken into consideration when medical conditions were allocated to priority groups.

[6] Inpatient treatment includes day surgery if the episode is given a DRG-code.

[7] We are grateful to Jacob Mosvold, consultant physician at 'Diakonhjemmet hospital' (Oslo) for translating descriptions of medical conditions into relevant ICD10-codes, and to professor in medicine Ole Frithjof Norheim for advice in use of the prioritization guidelines. See [17-19] for further documentation.

data set thus comprises inpatient treatment of elective patients with surgical procedures in somatic hospitals.

The third dataset is compound from the tax and education registers of Statistics Norway. Since the NPR (at least so far) does not have a unique personal identifier, information about socioeconomic status cannot be linked at the individual level. However, since the register has information about each hospital stay according to gender, year of birth and resident municipality, patients can be uniquely assigned to population cells that combine gender, age and municipality. For each cell, Statistic Norway has computed average income in 2004 and the population shares with primary, secondary and tertiary education by the end of 2004.[8] [9] This approach produces 42 099 data points for income and educational achievement.

We use pooled data for 2004 and 2005. During these years, 600 428 planned surgical admissions took place.[10] [11] 459 233 of these admissions (76.5 %) had ICD-10 codes that correspond to at least one of the medical conditions described by the guidelines published by Health Authority West. The other admissions had ICD-10 codes that were not covered by the guidelines. ICD-10 codes with large patient volumes not covered by the guidelines include varicose veins of lower extremities and hypertrophy of breast.

Many ICD-10 codes map into more than one medical condition described by the guidelines. Some of these ICD-10 codes, with 4 804 admissions altogether, both map into one or more medical conditions that give the right to treatment and at least one medical condition that do not give the right to treatment. Since the patient register does not have information about medical conditions – only ICD-10 codes – we do not know whether the

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[8] Income and education level are computed for patients aged 25 and older. For each gender and municipality, we have collapsed cells with birth year 1917 or earlier into one cell since a large share of these cells were empty. The same has been done for cells with birth year 1918-1922.
[9] Our income variable is annual pre-tax income from employment, self-employment and transfers (pensions, social assistance benefits, etc). Capital income is not included since the administrative registers of Statistics Norway lack data about capital gains.
[10] Medical abortions are not included in our data set.
[11] Since the medical guidelines were developed to cover elective care, we focus only on these patients. However, the results are similar when also acute care patients are included in the analysis.

patients with these ICD-10 codes actually have the right to treatment. We omit these patients from the analysis, leaving a total sample of 454 239 planned surgical admissions.

369 225 of 454 239 admissions (81.3 %) have ICD-10 codes that map into medical conditions that give the patients the right to treatment, whereas 85 204 admissions (18.7 %) have ICD-10 codes that map into medical conditions without the right to treatment. Table 1 lists the ICD-10 codes with largest patient volumes. Among ICD-10 codes with the right to treatment, derangement of meniscus, carpal tunnel syndrome, and unilateral or unspecified inguinal hernia have the largest number of patient episodes. ICD-10 codes with many patient episodes that do not give the right to treatment include unspecified senile cataract, shoulder impingement and other senile cataract.

- Table 1 about here -

Table 2 presents the data set. Our dependent variable (PRIORITY) is one if the patient belongs to an ICD-10 code that gives the right to treatment. Explanatory variables include indicators for gender and age, average income and the share of the cell population with secondary and tertiary education.

- Table 2 about here -

Since the dependent variable is a dummy variable, ordinary least squares estimates are not efficient. Probit and logit models constitute the standard tools for analyses of binary response data. We have estimated probit and logit models explaining priority status as a function of demographic and socioeconomic variables and find that the two models produce very similar results. For brevity, we report results for the probit model only.

Since we lack data about outpatient treatment and selection of patients to outpatient or inpatient treatment may differ systematically between hospitals, we control for hospital fixed effects by including dummy variables for hospitals. To control for the fact that distance to hospital might affect the choice of inpatient/outpatient care, and to allow for the fact that this effect might vary with age, we also include interactions between age indicators and distance to hospital. We have checked that inclusion of hospital dummies and distance variables does not affect any of our main conclusions.

A problem with fixed effect probit models is that the estimated effects might be severely biased. However, Monte Carlo evidence suggests that this bias drops off rapidly as the number of observations per group increases above three and is substantially reduced even at 20 observations per group [20-21]. Having an average of 5 475 patient episodes per hospital, we assume that this bias is insignificant in our analysis.

4. Empirical analysis

We first consider the effects of gender and age on the probability of belonging to an ICD-10 code with the right to treatment. Table 3 presents marginal probabilities with z-values in parentheses.

- Table 3 about here -

The first column of table 3 shows that men and young people have a higher probability of being treated for medical conditions that give the right to treatment than women and older people. For a given age level, the likelihood of being categorized with a right to treatment is 1.4 percentage points higher for men than for women. The probability of having the right to treatment is monotonically decreasing with age. Age differences are large; children have 40-45 percentage points higher probability of being in an ICD-10 code with a right to treatment than patients above 80.

The two last columns of table 3 present separate analyses for men and women. Age differences are large for both genders and somewhat larger for women. Compared to children, men (women) above 80 have 40 (50) percentage points lower probability of being treated for a medical condition that gives the right to treatment.

We next consider in more detail how gender differences depend on age. In table 4, we have included interaction terms between gender and four age groups. The regressions include a full set of fixed effects for birth year, hospital fixed effects and interactions between age indicators and distance to hospital.

- Table 4 about here -

Gender differences are largest among patients above 60. In this age group, men have 2.8 percentage points higher probability of having an ICD-10 code with the right to treatment. Among young adults (aged 20-39), women are somewhat more likely to have the right to treatment, whereas the opposite is the case for people below 20.

- Table 5 about here -

Table 5 presents effects of the cell population's average income for the population aged 25 and above. A full set of fixed effects for interactions between gender and birth year, hospital fixed effects, and interactions between age indicators and distance to hospital are included. Hence, we exploit variation between municipalities in the average income of persons with the same gender and age, but not variation in income between genders or age groups. Reported z-values are corrected for correlation within population cells.

For women below 50, there is a positive and significant association between income and the probability of having an ICD-10 code that gives the right to treatment. An increase in average income of 100 000 NOK (~ $ 15 000) is associated with an increase in the probability by 2.3 percentage points There are also positive associations for men below 50 and for women 50 and above, but these effects are small and statistically insignificant.

- Table 6 about here -

Table 6 presents effects of the share of the cell population with secondary education (= completed high school) and tertiary education (= at least one year of college education) for the population aged 25 and above. The coefficient of secondary (tertiary) education can be interpreted as the difference in probability between a person with secondary (tertiary) education and a person with no more than compulsory schooling.

The coefficient of secondary education is always small and insignificant, implying that there are modest differences between patients without high school and patients with high school but with no college education. The coefficient of tertiary education is positive and significant for the total population as well as for both genders. The total sample estimate implies that a patient with some college education has 4.7 percentage points higher probability of having the right to treatment than a patient that has not completed high school.

The coefficient of tertiary education is small and insignificant for men 50 and above, but large and significant for men below 50. A male patient below 50 with tertiary education has 13.4 percentage points higher probability of having an ICD-10 code that gives the right to treatment than a male patient below 50 without high school. The effect of tertiary education is small and insignificant for women below 50 and large and significant for women 50 and above. In the latter age group, a female patient with tertiary education has 7.8 percentage points higher probability of receiving the right to treatment than a female patient without high school.

5. Concluding remarks

In this paper, we have compared elective patients with and without a legal right to treatment. Medical guidelines published by a regional health authority have been used to distinguish between the two groups of patients. We find that women and older people are overrepresented among patients without the right to treatment. Conditional on age and gender, women without the right to treatment have lower income and less education than women with the right to treatment. Among men below 50, patients without the right to treatment have less education than patients with the right to treatment.

Targeting treatment at patients with high priority appears to be a fair and medically sensible response to the rising gap between what can be done and what can be financed in specialist health care. However, our results suggest that such policy measures have distributional consequences that may be considered undesirable by society.

One potential problem with our analysis is that patients with lower socioeconomic status might be more likely to get acute hospital treatment. The argument is that patients with lower socioeconomic status have longer waiting time, and thus may become acute ill while waiting. But, since we get similar results also when acute care patients are included in the analysis, the above mentioned argument is not relevant for our analysis.

The exact distribution of winners and losers will depend on policy details, such as how the allocation of funds between regional health authorities, hospitals and hospital departments is affected, and which hospital services that get higher priority. What our study has shown is that patients with low socioeconomic status are overrepresented among patients without the right to treatment; it is likely that many people in these groups receive less treatment when cutback in hospital services is introduced.

It is important to investigate why individuals with lower socioeconomic statues are overrepresented among patients with lower prioritized diseases, since unbalanced distributions of treated patients regarding age, gender or socioeconomics status, do not necessary suggest that the distributional consequences are unacceptable. It might be that patients of lower socioeconomic status have illnesses that from a medical point of view should be given lower priority. Another reason is that patients with the same medical need have different ability to communicate and argue for the need for prioritized treatment. If this is the case, the distributional consequences of cutback of certain hospital treatments will be undesirable. If one believes that this factor is relevant, one policy might be to review the prioritization guidelines to check if diseases and procedures that are most common for individuals with low socioeconomic status are given too low priority.

Finally, it might be the case that variation in hospital capacity or prioritization practice at the regional level correlates with regional variation in income and demographic factors. If this is the case, distributional consequences might be undesirable, not because of prioritization of patients, but because of regional fiscal imbalance. The relevant question has to do with the financing system of regional authorities, and not prioritization. Since we control for hospital fixed effects, we don't think this explanation is the most relevant for our case.

Recent studies indicate that that waiting times and utilization of specialist care are affected by socioeconomic status [4-8]. Our study indicates that cutback of hospital services with low priority might reinforce this pattern. If it is the case that reduced access implies worse health, this policy might contribute to increasing socioeconomic health inequality. It is thus important to investigate how removal of non-prioritized specialized health care affects patients' health status in future work.

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Table 1
ICD-10 codes with large patient volume

	# episodes 2004-2005
With the right to treatment	
M232 Derangement of meniscus	23 464
G560 Carpal tunnel syndrome	12 705
K409 Unilateral or unspecified inguinal hernia	12 085
Without the right to treatment	
H25.9 Senile cataract, unspecified	23 580
M75.4 Impingement syndrome of shoulder	11 432
H25.8 Other senile cataract	8 155

Table 2
Variable description and summary statistics. Observations: 454 429 patient episodes.
Income and educational achievement variables: 42 099 cell data points

		Mean (St.dev)
Dependent variable:		
PRIORITY	= 1 if patient has the right to treatment	0.813
Indicator for gender:		
Male	1 = if male	0.459
Age-indicators:		
Age 0	= 1 if birth year = 2004	0.003
Age 1-6	= 1 if 1998 <= birth year < 2004	0.054
Age 7-19	= 1 if 1985 <= birth year < 1998	0.043
Age 20-29	= 1 if 1975 <= birth year < 1985	0.050
Age 30-39	= 1 if 1965 <= birth year < 1975	0.102
Age 40-49	= 1 if 1955 <= birth year < 1965	0.137
Age 50-59	= 1 if 1945 <= birth year < 1955	0.178
Age 60-66	= 1 if 1938 <= birth year < 1945	0.114
Age 67-73	= 1 if 1931 <= birth year < 1938	0.106
Age 74-80	= 1 if 1924 <= birth year < 1931	0.117
Age 81+	= 1 if birth year < 1924	0.096
Income (Age>=25):		
Income	Average earnings less capital income in 2004 of cell population (in 10^5 NOK)	2.39 (0.86)
Educational attainment (Age>=25):		
Primary education	Share of cell population without upper secondary school	0.289 (0.219)
Secondary education	Share of cell population with at least one year of upper secondary school but without education at college level	0.539 (0.173)
Tertiary education	Share of cell population with at least one year of education at college level	0.172 (0.127)

Table 3
Effects of gender and age on PRIORITY. Marginal probit estimates (z-values in parentheses). Hospital fixed effects and interactions between age indicators and distance to hospital included but not reported

	All patients (N = 454 429)	Men (N = 208 685)	Women (N = 245 744)
Male	0.014 (13.0)		
Age 0	0.107 (6.72)	0.111 (6.38)	0.080 (2.70)
Age 1-6	0.075 (16.8)	0.084 (16.1)	0.057 (7.65)
Age 7-19	0.020 (4.10)	0.030 (4.79)	0.008 (0.99)
Age 20-29		Baseline category	
Age 30-39	-0.038 (8.94)	-0.031 (5.63)	-0.047 (7.29)
Age 40-49	-0.109 (25.3)	-0.089 (15.8)	-0.133 (20.7)
Age 50-59	-0.158 (36.6)	-0.123 (22.2)	-0.193 (29.4)
Age 60-66	-0.167 (36.0)	-0.132 (22.2)	-0.202 (28.5)
Age 67-73	-0.205 (42.5)	-0.146 (23.7)	-0.262 (35.5)
Age 74-80	-0.287 (57.8)	-0.212 (33.0)	-0.352 (47.2)
Age 81+	-0.370 (69.8)	-0.301 (41.4)	-0.425 (55.2)
Log L	-185 005	-81 143	-103 996
Log L at zero	-219 295	-93 932	-124 795

Table 4
Age-specific effects of gender on PRIORITY. Marginal probit estimates (z-values in parentheses). Fixed effects for birth year, hospital fixed effects and interactions between age indicators and distance to hospital included. 454 429 observations

Male x Age 0-19	0.019 (4.00)
Male x Age 20-39	-0.023 (7.06)
Male x Age 40-59	-0.0002 (0.10)
Male x Age 60+	0.028 (19.6)

Table 5
Effect of income on PRIORITY. Marginal probit estimates. Fixed effects for gender x birth year, hospital fixed effects and interactions between age indicators and distance to hospital included. z-values adjusted for clustering at the cell level in parentheses

	All patients (N = 399 602)	Men (N = 179 096)	Women (N = 220 506)	Men 25<= Age < 50 (N = 54980)
Income	0.0019 (0.72)	0.0005 (0.17)	0.0122 (2.10)	0.0057 (1.57)

	Men Age >= 50 (N = 122 999)	Women 25<= Age < 50 (N = 66 669)	Women Age >= 50 (N = 153 837)
Income	-0.0066 (1.73)	0.0227 (3.79)	0.0003 (0.04)

Table 6

Effect of education on PRIORITY. Marginal probit estimates. Fixed effects for gender x birth year, hospital fixed effects and interactions between age indicators and distance to hospital included. z-values adjusted for clustering at the cell level in parentheses

	All patients (N = 399 602)	Men (N = 179 096)	Women (N = 220 506)
Primary education	Baseline category		
Secondary education	0.0183 (1.64)	0.0156 (1.24)	0.0065 (0.43)
Tertiary education	0.0465 (3.90)	0.0278 (1.93)	0.0818 (4.39)

	Men 25<= Age < 50 (N = 54 980)	Men Age >= 50 (N = 122 999)	Women: 25<= Age < 50 (N = 66 669)	Women: Age >= 50 (N = 153 837)
Primary education	Baseline category			
Secondary education	0.0396 (1.37)	0.0259 (1.63)	-0.0462 (1.68)	0.0234 (1.26)
Tertiary education	0.1336 (4.38)	-0.0229 (1.22)	0.0362 (1.25)	0.0788 (2.95)

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