

The influence of patients' complexity and general practitioners' characteristics on referrals to outpatient health services in an Italian region

Francesca Valent¹, Laura Deroma², Antonella Franzo^{1,3}, Michele Gobatto¹, Giorgio Simon³, Luigi Canciani⁴ and Loris Zanier¹

¹Direzione Centrale Salute, Integrazione Sociosanitaria, Politiche Sociali e Famiglia, Regione Autonoma Friuli Venezia Giulia, Udine, Italy

²Azienda Ospedaliero-Universitaria di Udine, Udine, Italy

³Azienda per l'Assistenza Sanitaria n. 5 "Friuli Occidentale", Pordenone, Italy

⁴Distretto Sanitario di Codroipo, Codroipo, Udine, Italy

Abstract

Background. Patient referrals to outpatient health services may affect both health outcomes and health expenditures. General practitioners (GP) have a crucial role in driving the use of outpatient services and recognizing factors which affect referrals is important for health managers and planners.

Objectives. We investigated patient- and physician-related determinants of patient referrals in an Italian region.

Methods. This was cross-sectional study based on the individual linkage of administrative databases from the health information system of the Friuli Venezia Giulia region. For each GP of the region, the association of the number of patient referrals to different types of outpatient services with the proportion of patients with chronic conditions, with the number of hospital admissions and drug prescriptions in 2012, and with GP's characteristics was investigated through multilevel multivariable Poisson regression models.

Results. Some chronic conditions (e.g., cancer, autoimmune diseases, endocrine diseases, digestive system diseases) were positively associated with the number of referrals, as were hospital admissions and drug prescriptions. Time since GP's graduation was inversely related with referrals.

Conclusion. Patient complexity and GP's experience affect referral rates. These factors should be considered in case of a reorganization of the general practice structure in Friuli Venezia Giulia.

Key words

- general practitioners
- outpatient health services
- ambulatory care
- chronic diseases

INTRODUCTION

Outpatient service use in a population may depend on a number of factors. Socio-demographic (e.g., sex, insurance status, education) and geographic factors (e.g., area of residence) were shown to affect outpatient service utilization and equity in Iran [1]. In Germany, supply-side factors were shown to account for almost half of the inequalities in access [2], where demand-side aspects accounted for less than one third and morbidity, in particular, for about 5%. A recent Italian study found some inequity in the use of outpatient specialist care, basic medical tests, and diagnostic services in favor of the well-off [3], partly explainable because, for

accessing those services, even in public hospitals and clinics, there is a small flat rate copayment which may discourage some low income patients from seeking care in cases they judge not strictly necessary.

General practitioners (GPs) play a crucial role in the utilization of outpatient health services. In fact, they may refer patients to specialist care either to obtain one-time advice or to receive continuous feedback on the management of complex cases, especially in situations where their knowledge or confidence are limited. Some substitution effect [2] cannot be excluded as well: Italian GPs earn a large part of their income through a fixed payment they receive for each patient, regardless

of patient's complexity and of the workload associated with the actual patient's treatment and they may be induced to seek a reduction of their workload through the frequent referral of patients to hospital outpatient services.

Referrals to outpatient services may affect not only patients' health outcomes but also health expenditures. Thus, recognizing factors that affect referral patterns, and thus forecasting future demands and identifying sources of inequity, is important to health managers and planner.

In Friuli Venezia Giulia, an Italian Northeastern region with 20 health districts, approximately 1000 GPs and one million inhabitants ≥ 15 years of age, a cohort study had highlighted some heterogeneity in care profiles adopted by GPs among persons with diabetes [4]. However, factors associated with referrals to outpatient services have never been explored. In the administrative databases of the regional health information system, the records of all the outpatient services provided by public hospitals and clinics at the request of a GP are registered. Individual information contained in those databases can be linked through a univocal anonymous key to a variety of additional health-related data. Therefore, we decided to investigate patient- and physician-related determinants of GP's attitudes towards referring patients to outpatient health services in Friuli Venezia Giulia, analyzing the information available from the regional administrative health system databases.

METHODS

In this cross-sectional study, we used various databases from the regional health information system as sources of information: the GPs database, the outpatient service database, the drug prescription database, the hospital admission database, and the database of exemptions from medical payment. Each person having contacts with the regional health system is identified by a univocal anonymous key, which is the same across all databases and allows deterministic record linkage on an individual basis. We linked on an individual basis all those datasets for the year 2012.

In that year, 980 GPs were active in the Friuli Venezia Giulia region. We attributed patients to each GP based on the actual number of days they were under the care of that physician in 2012. For each patient we used hospital admission, outpatient health service, drug prescription and exemptions from medical charges data to determine whether the person was affected by chronic conditions, according to the criteria described by the Local Health Agency of Brescia, Italy [5]. In short, a person was defined as affected by a certain chronic condition in 2012 if he/she satisfied, in that specific year, at least one of the following conditions: being exempt from medical charges because of that particular chronic condition; being prescribed drugs specifically used for the treatment of that chronic conditions; being discharged from the hospital with a diagnosis related to that chronic condition; undergoing outpatient visits or exams related to that chronic condition.

The following conditions were assessed: chronic lung diseases, chronic heart failure, other cardiovascular

diseases (includes hypertension, vascular diseases, and heart diseases), diabetes mellitus, disorders of lipid metabolism, HIV, chronic kidney disease, rare diseases, cancer, digestive system diseases (includes gastroesophageal, enteric, and hepatic diseases), autoimmune diseases (includes rheumatoid arthritis, systemic erythematosus lupus, systemic sclerosis, Sjogren's disease, ankylosing spondylitis, myasthenia gravis, Hashimoto's thyroiditis, autoimmune hemolytic anemia), endocrine diseases (includes acromegaly and gigantism, diabetes insipidus, Addison's disease, hypo- or hyperparathyroidism, acquired or congenital hypothyroidism, Cushing's disease, Basedow's disease, hypophysary dwarfism), neurological diseases (includes epilepsy, Parkinson's disease, Alzheimer's disease, multiple sclerosis, neuro-myelitis optica, dementia), transplantation, delivery.

For each GP, we calculated the following variables:

- the number and proportion of patients affected by each of the above listed conditions;
- the weighted population of patients, where each patient was weighted according to age as follows: 15-24 years 0.390; 25-44 years 0.650; 45-64 years 1.560; 65-74 years 2.177; ≥ 75 years 2.074 [6];
- the number of overall referrals to outpatient health service in 2012;
- the number of particular outpatient prescriptions (specialty visits, laboratory services, radiology services, and nuclear medicine diagnostic services) in 2012;
- the number of hospital admissions per weighted patient in the population of patients in 2012;
- the overall number of drug prescriptions per weighted patient among the patients in 2012.

For each GP, we calculated the overall number of referrals to outpatient health services per 1000 weighted patients as an indicator of the "prescribing attitude" of the GP. Then, we investigated the relation between the number of outpatient health services, both overall and of specific types, and characteristics of the GPs and of their patients through multivariate Poisson regression models in which GPs were clustered in the 20 health districts. Five multivariate models were built: one for all outpatients health service, and one for each of the following outpatient prescriptions: specialty visits, laboratory services, radiology services, and nuclear medicine diagnostic services. The weighed population of each GP was used as the offset variable in the models, with a logarithm link function. The covariates included in each model were the proportions of patients with each chronic condition, the number of hospital admissions, the number of drug prescriptions, the age of the GP and the years since graduation. The association of each outcome with the covariates was expressed through the rate ratios (RR) and 95% confidence intervals (95% CI). P-values < 0.05 were considered statistically significant. All analyses were conducted using SAS Enterprise Guide v4.3 (SAS Institute Inc., Cary, NC, USA).

RESULTS

The distribution of the patients of the 980 GPs active in Friuli Venezia Giulia in 2012 is illustrated in *Table 1*. On average, GPs had a weighted patients population which was larger than the non-weighted one. Cardio-

Table 1
Distribution of the patients of 980 GPs of the Friuli Venezia Giulia Region, Italy, year 2012

Characteristic	Mean (SD) ^a	Median (Q1-Q3) ^b
Number of patients	1113 (424)	1230 (860-1490)
Weighted number of patients	1469 (571)	1628 (1135-1935)
Proportion of patients with		
chronic lung diseases	3.3 (1.0)	3.3 (2.7-3.8)
chronic heart failure	0.5 (0.3)	0.5 (0.3-0.7)
other cardiovascular diseases	13.7 (3.9)	13.6 (11.0-16.1)
diabetes mellitus	6.0 (1.6)	5.9 (4.6-7.6)
disorders of lipid metabolism	6.1 (2.2)	5.9 (4.6-7.6)
HIV	0.1 (0.1)	0.1 (0-0.1)
chronic kidney disease	0.6 (0.4)	0.5 (0.3-0.8)
rare diseases	0.8 (0.5)	0.7 (0.5-1.0)
cancer	7.7 (2.0)	7.6 (6.4-8.9)
diseases of the digestive system	1.2 (0.5)	1.1 (0.9-1.4)
autoimmune diseases	2.2 (1.0)	2.1 (1.5-2.8)
endocrine diseases	1.4 (0.6)	1.4 (1.0-1.7)
neurological diseases	0.9 (0.4)	0.9 (0.6-1.1)
transplantation	0.1 (0.1)	0.1 (0-0.1)
Proportion of women who delivered a baby (%)	0.8 (0.5)	0.8 (0.5-1.0)
Number of hospital admissions per 1000 weighted patients	127 (28)	124 (113-136)
Number of drug prescriptions per 1000 weighted patients	8029 (1386)	8004 (7182-8822)

^aSD = standard deviation.
^bQ1 = 25th percentile; Q3 = 75th percentile.

Table 2
Distribution of prescriptions of outpatient health services among the patients of the 980 GPs of the Friuli Venezia Giulia Region, Italy, year 2012

Characteristic (per 1000 weighted patients)	Mean (SD) ^a	Median (Q1-Q3) ^b
Patients with at least one prescription of outpatient health service	539 (193)	506 (479-539)
Prescriptions of outpatient health services	11 620 (2391)	11 380 (10 208-12 790)
Patients with at least one prescription of outpatient specialty visit	241 (82)	230 (204-262)
Prescriptions of outpatient specialty visit	390 (126)	374 (319-434)
Patients with at least one prescription of laboratory exam	388 (94)	376 (349-408)
Prescriptions of laboratory exams	8434 (1988)	8261 (7218-9393)
Patients with at least one prescription of radiology exam	191 (40)	188 (170-206)
Prescriptions of radiology exams	398 (91)	393 (344-442)
Patients with at least one prescription of nuclear medicine exam	6 (3)	6 (4-7)
Prescriptions of nuclear medicine exams	11 (8)	9 (6-13)

^aSD = standard deviation.
^bQ1 = 25th percentile; Q3 = 75th percentile.

vascular diseases, cancer, diabetes, and disorders of the lipid metabolism were the conditions affecting the largest proportions of patients.

The distribution of referrals to outpatient health services and of the patients with such prescriptions is shown in *Table 2*. On average, among the GPs of the Region, over 500 persons/1000 weighted patients were prescribed at least one outpatient health service in

the year, for an average of more than 11 000 prescriptions/1000 weighted patients, the majority being laboratory exams.

The association between the overall number of referrals to outpatient health services by each GP, the number of patients with chronic conditions, and demographic characteristics of the GPs are presented in *Table 3*. The number of patients with rare diseases, cancer,

Table 3

Association between all outpatient health services prescribed by each GP, hospital admissions, drug prescriptions, number of patients with chronic conditions, and GP's demographic characteristics

Variable	RR ^a	95% CI
Number of patients with:		
chronic lung disease	1.003	0.993-1.013
chronic heart failure	0.955	0.934-0.974
other cardiovascular disease	0.999	0.995-1.003
diabetes mellitus	1.000	0.987-1.012
disorders of lipid metabolism	1.002	0.994-1.009
HIV	1.099	0.999-1.209
chronic kidney disease	1.027	0.985-1.071
rare disease	1.020	1.005-1.035
cancer	1.014	1.008-1.020
diseases of the digestive system	1.038	1.016-1.059
autoimmune disease	1.052	1.036-1.068
endocrine disease	1.043	1.018-1.068
neurological disease	1.014	0.980-1.049
transplanted organ	1.043	1.004-1.083
Number of women who delivered a baby	1.056	1.030-1.082
Number of hospital admissions per weighted patient	4.551	2.531-8.184
Number of drug prescriptions per weighted patient	1.044	1.030-1.059
GP's age (years)	1.001	0.998-1.003
GP's years since graduation	0.995	0.993-0.998

Exchangeable working correlation: 0.1387 (correlation of the responses from subjects within district).

^aRR: rate ratio adjusted for all the variables shown in the Table.

diseases of the digestive system, autoimmune diseases, endocrine diseases, of transplanted patients and of women who delivered a baby were positively associated with an increased number of prescription of outpatient health services. Hospital admissions and drug prescriptions per weighted patient were also significantly associated with outpatient health service referrals. On the other hand, the number of patients with chronic heart failure was inversely related with referrals to ambulatory care. Time since the GP's graduation was also inversely related with referrals to ambulatory care.

The magnitude of significant associations with the referrals to specific types of outpatient health services is shown in *Table 4*.

DISCUSSION

In this study, consistently with previous research [7], we found that the distribution of chronic conditions of the patients of a GP influences the GP's attitude towards referring to outpatient health services. In particular, in our region, the larger the number of patients with cancer, diseases of the digestive system, autoimmune, endocrine, and rare diseases, of transplanted patients and of pregnant women and the more GPs tend to refer patients to hospital outpatient care. The effect of patients' comorbidities on the use of ambulatory services, however, is not uniform across different services. For example, the number of patients with cancer was positively related

with laboratory exams, radiology exams, and in particular nuclear medicine exams, which are part of the follow-up of neoplastic patients, but not with visits. This means that, apart from oncologic follow-up visits, which in our region may be provided by the hospital oncology clinics with no need of a GP's prescription, patients with cancer do not increase the referral of patients to other hospital outpatient specialty visits. The number of patients with digestive, endocrine, and autoimmune diseases, on the other hand, are associated with increased prescriptions of visits, laboratory exams, and radiology exams, indicating that these patients may either pose to GPs a quite cumbersome workload, or require a particularly complex management, or be difficult to manage if GPs are not sufficiently trained. Some diseases were associated with only one type of ambulatory service. For example, the number of patients with chronic lung disease resulted associated with increased prescriptions of radiology exams only, or the number of patients with HIV was only associated with increased prescriptions of laboratory exams. This information can be used as a starting point for judging the appropriateness of the present system for paying GPs in Italy. Flat payment on a per-patient basis may not reflect the actual GP's workload. Even weighing patients according to age may not reflect entirely the patients' complexity. Taking into account the distribution of chronic conditions of patients might help estimating the real workload and assigning funding accordingly.

Table 4

Significant associations between specific types of outpatient health services prescribed by each GP, hospital admissions, drug prescriptions, number of patients with chronic conditions, and GP's demographic characteristics

Variable	RR* (95% CI)			
	Visits	Laboratory exams	Radiology exams	Nuclear medicine diagnostic exams
Number of patients with:				
chronic lung disease			1.024 (1.013-1.034)	
chronic heart failure	0.926 (0.880-0.973)	0.954 (0.927-0.982)	0.934 (0.897-0.973)	
other cardiovascular disease				
diabetes mellitus				
disorders of lipid metabolism				
Number of patients with HIV		1.151 (1.034-1.282)		
chronic kidney disease	1.119 (1.036-1.208)			
rare disease	1.042 (1.006-1.080)			1.100 (1.014-1.194)
cancer	0.989 (0.981-0.998)	1.012 (1.004-1.020)	1.016 (1.010-1.022)	1.093 (1.070-1.115)
diseases of the digestive system	1.035 (1.013-1.057)	1.044 (1.018-1.070)	1.029 (1.003-1.056)	
autoimmune disease	1.055 (1.028-1.084)	1.058 (1.040-1.076)	1.047 (1.030-1.064)	
endocrine disease	1.041 (1.012-1.070)	1.050 (1.020-1.082)	1.030 (1.011-1.051)	
neurological disease				
transplanted organ		1.054 (1.003-1.108)		
Number of women who delivered a baby	1.076 (1.045-1.108)	1.062 (1.031-1.094)		1.155 (1.040-1.282)
Number of hospital admissions per weighted patient	19.826 (7.779-50.527)	3.372 (1.706-6.666)	6.275 (3.840-10.256)	
Number of drug prescriptions per weighted patient	1.027 (1.010-1.044)	1.054 (1.037-1.071)	1.038 (1.020-1.056)	
GP's age (years)				
GP's years since graduation	0.994 (0.991-0.997)	0.995 (0.992-0.997)	0.997 (0.995-1.000)	
	Correlation from subjects within district			
Exchangeable working correlation	0.2501	0.1822	0.0704	0.3349

*RR: rate ratio adjusted for all the variables shown in the Table.

The relevance of the associations that we detected between certain chronic diseases and the prescriptions of outpatient services can be fully appreciated by taking into account not only the magnitude of the associations, but also the frequency of the diseases among the patients of the regional GPs. In fact, despite the fact that rare diseases and transplanted organs are associated with an excess rate of prescriptions of 2.0 and 4.3%, respectively, these conditions are quite rare. Thus, only a limited amount of prescriptions can be attributed to those conditions. On the other hand, autoimmune and endocrine diseases were not only associated with high excess rates of prescriptions (5.2 and 4.3%, respectively), but they were also quite common among the pa-

tients of the regional GPs. For the same reason, the impact of cancer patients on prescriptions is relevant, despite a modest RR, because the prevalence of this condition is very high.

The result that the number of patients with some chronic conditions (e.g., diabetes, heart diseases) was not associated with referrals to ambulatory specialty care was unexpected. In fact, for example, GPs should be able to manage the recommended periodic testing of persons with diabetes [8]. Using the regional health information system, in the near future we will need to investigate whether the persons with diabetes residing in Friuli Venezia Giulia undergo the appropriate testing according to the recommended schedules [9]. If the

guidelines are largely disattended, the Regional Health Authority will have to promote integrated care pathways which establish the role of GPs in the management of these patients.

Hospital admissions and drug prescriptions were positively associated with ambulatory care use. The relation between these three variables is multifaceted. In fact, a GP who refers many people to hospital outpatient services might be able to manage patients reducing unnecessary hospital admissions. On the other hand, a GP may need to prescribe ambulatory care services more frequently than others if his patients have particularly serious comorbidities and are, consequently, in greater need of hospital care. In addition, part of the prescriptions of outpatient care services might have been suggested by medical specialists who treated patients with severe or complex conditions, with the GP just filling out the prescriptions. Thus, both hospital admissions and the prescriptions of outpatient services and drugs can be interpreted as markers for a highly complex patient population. In our study, however, we adjusted our analyses for the proportions of patients with chronic conditions and so confounding due to comorbidities is at least partly accounted for. Thus, the positive association of outpatient service use, drug prescriptions and hospital admissions could suggest that some GPs have a more evident generic attitude towards “prescribing” than others. However, since we could adjust the analyses for the frequency of the chronic conditions but not for their severity, we cannot exclude that some GPs are frequent prescribers because their patients have more severe diseases.

Differently from Chan and Austin [7], physician's age was not associated with referral attitude. In our study, however, a characteristics of GPs which seems to influence the referring attitude was years since graduation. GPs who graduated late are “old” if we consider age but “young” if we consider work experience. We found that the more experienced physicians tend to prescribe less outpatient services, regardless of the complexity of the population of patients. This may depend on a greater self-confidence level of these GPs and a smaller need for external aids to diagnosis and management of diseases. Less experienced physicians might be in greater need of training and guidelines. In other settings, GPs reported knowledge deficits and little confidence in the management of chronic conditions [10-14]. In addition to offering GPs high quality training and continuing medical education programs, experimenting new approaches to general practice may improve the quality of care provided by GPs as well as increase efficiency. A

recent study showed that Italian patients would prefer a “primary care center” with many diagnostic facilities rather than a “solo GP” model or a “group general practice” [15]. New organizational solutions providing different professional skills and diagnostic services in the same practice and impacting on both the GPs' confidence and waiting times [15] could be tested. From our study, prescriptions within each health district resulted moderately correlated with each other, suggesting that the district policies influence the GPs' behaviors. If a novel approach to general practice is to be implemented in Friuli Venezia Giulia, the health districts should take an active role in its organization.

The results of this study should be interpreted in the light of a number of limitations. First, we lack data on referrals to private specialty care. Although in the United Kingdom private referral rates were positively associated with the NHS referrals [16], in our region more than one fourth of the health expenditure is out-of-pocket [17] and we have no information regarding the relation between private and public ambulatory referrals.

Then, we lack information of GPs' actual workload (*i.e.*, the number of visits or contacts with their patients) and on the distribution of socioeconomic variables among a GP's patient population, two factors that may influence referral rates. Thus, our findings may contain residual confounding due to unmeasured variables.

Further analyses may identify additional factors driving patient referral rates in Friuli Venezia Giulia. However, our findings recognized some factors that should be taken into consideration in a possible reorganization of the regional general practice.

Authors' contributions

Francesca Valent participated in the study design and in analysis of the data and wrote the manuscript; Laura Deroma participated in the study design and in analysis of the data and critically revised the manuscript; Antonella Franzo and Michele Gobbato contributed to the analysis of the data and critically revised the manuscript; Giorgio Simon and Luigi Canciani provided inputs to the analysis and critically revised the manuscript, Loris Zanier participated in the study design and critically revised the manuscript.

Conflict of interest statement

None.

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