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Impact of co-morbidity on the individual's choice of primary healthcare provider

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Key points of the article:

In a market-oriented primary healthcare (PHC) system which is under development in Sweden it is important to be able to understand and to monitor factors of importance for the individual's choice of PHC provider.

We found that age, gender and co-morbidity were important factors for the choice of PHC provider.

The probability to choose a public- instead of private PHC provider increased with higher age, female gender and higher co-morbidity level of the individuals.

Abstract

Objective. We studied whether age, gender and co-morbidity were of importance for an individual's choice of listing with either a public or a private primary healthcare (PHC) practice.

Design and setting. Our study was a register-based closed cohort study in one private and one public PHC practice in Blekinge County in southern Sweden. *Subject*s. We studied a cohort (12,696 individuals) comprising all those listed with the public or private PHC practice on 1 October 2005 who were also listed with the public PHC practice on 1 October 2004. *Main outcome measures.* The listing/re-listing behaviour of the population in this cohort was studied at two points in time, 1 October 2005 and 1 October 2006, with respect to age, gender and co-morbidity level as measured by ACG Case-Mix system. *Results.* Individuals listed with the public practice both on 1 October 2005 and one year later were significantly older, were more often females and had a higher co-morbidity level than individuals listed with the private practice. Individuals with a higher co-morbidity level were more likely to re-list or to stay listed with the public practice.

Conclusions. This study shows that the probability of choosing a public instead of private PHC provider increased with higher age and co-morbidity level of the individuals. We suggest that using a measure of co-morbidity can help us understand more about the chronically ill individual's choice of healthcare provider. This would be of importance when healthcare policy makers decide about reimbursement system or organisation of PHC.

Key words: age, case-mix, co-morbidity, primary health care, Sweden

Introduction

The number of primary healthcare (PHC) patients with more than one chronic disease is increasing and they account for a large part of all resources in the healthcare system [1]. These patients' perceptions and trust in their PHC provider is important for the whole healthcare system. Co-morbidity increases in an aging population [2] and a previous study from Sweden have shown that prevalence of patients with more than one chronic disease can be as high as 55% in patients over 77 years old [3] but can range between 10% for patients under 20 years old to over 70% for patients over 80 years old [4].

PHC in Sweden is not financed, provided and organised by the state. It is financed by the county councils and provided by either the county councils or by other healthcare providers. In the 1990s criticism of public healthcare for its bureaucracy, low efficiency, long waiting times [5, 6] was a reason to start privatisation of the healthcare system. So far it has had the result that about 13% of general practitioners work as private doctors, but only a few private hospitals exist [7].

However, recently there has been an increase in the private healthcare sector due to a change in regulations in Swedish healthcare. Individuals in many Swedish counties can now freely choose whether they want to be listed with a public or a private PHC practice. It has given rise to a debate regarding the access of care for individuals in socioeconomically challenged areas and elderly individuals with co-morbidities [8, 9]. Access to a private PHC can be different from a public one because in order to increase profits the private PHC tends to decrease costs [10] as it is solely reimbursed by the county council. The public PHC in Sweden is non-profit. In a study from Finland, suffering from chronic disease was associated with worse accessibility to private PHC, although generally accessibility and continuity of care in private PHC were better than in public PHC [11]. Patients' choice of healthcare

provider, especially with regard to patients with co-morbidities, has become a hot topic and a cause of much debate during the current privatisation of PHC in Sweden.

The aim of this study was to investigate whether co-morbidity was of importance for the individual's choice of listing with either public or private PHC in a municipality in Blekinge, Sweden.

Material and methods

Study design and study population

The study population comprised all those listed (16,882) with two PHC practices (one private and one public) serving the municipality of Ronneby in Blekinge County with urban and rural areas in the southern Sweden during the period from 1 October 2005 to 1 October 2006. Data on age, gender, and date of listing/re-listing were obtained from the Blekinge County Council's listing database (LisBet™).

From the study population, a sub-population was identified as a closed cohort comprising all those 12 696 individuals listed with the public practice on 1 October 2004, who were listed with either the public or the private practice on 1 October 2005 (Figure 1 and Figure 2). The sub-population was identified as the co-morbidity calculation using the ACG Case-Mix system needed data on collected diagnoses one year prior to the start of the study, which was only obtainable from individuals listed with the public practice in 2004.

Variables

The dependent variable was the listing/re-listing status of the individuals from the cohort with respect to the public or the private PHC practice on 1 October 2005 and 1 October 2006.

The independent variables were model of PHC, co-morbidity, age and gender.

Two PHC practices served the municipality of Ronneby. One of these practices was a county council-owned PHC practice (public) established in 1974, which in 2005 had 6.25 positions for family physicians. On 1 October 2005 a private PHC practice with 3 positions opened under contract with Blekinge County Council to offer services similar to those of the public practice. In Blekinge County individuals can actively choose to list with the family physician they want. Those who do not make a choice are passively listed with the nearest PHC practice and they can re-list with the other practice whenever they wish.

The Johns Hopkins ACG (Adjusted Clinical Groups) Case-Mix System [12] was used as the measure of co-morbidity. This system was developed in the 1980s to evaluate the relationship between individual morbidity and utilisation of healthcare services. Each ACG group consists of individuals with the same type and degree of co-morbidity [13, 14]. In our study all individuals in the study population were assigned to one of six levels of co-morbidity, so-called resource utilisation bands (RUBs). The population in RUB 0 had no need for healthcare and those in RUB 5 had a very high degree of need for healthcare resources.

Statistical analysis

In order to analyse the differences between the number of individuals listed with the public and the private practice and re-listing during the study period, chi-squared tests were used. To analyse the importance of co-morbidity level for re-listing, logistic regression was used. We analysed the relation between co-morbidity level and re-listing status after adjusting for age and gender in two subsequent models. A result of $p < 0.05$ was considered statistically significant.

All analyses were performed using the statistical package STATA version 10 (Stata Corporation, Texas, USA).

Results

1. Listing status at the beginning and the end of our study

The opening of the private PHC practice on 1 October 2005 reduced the number of individuals in the study cohort originally listed with the public PHC practice on 1 October 2004 by 11.6% (Table I). The proportion of males listed with the private practice was significantly higher than in the public practice, both at the beginning and at the end of the study (Table I). The proportion of children (aged 0-19) listed with the private practice was higher compared to the public practice at the end of the study (Table I). Individuals aged over 60 were more often listed with the public practice, whereas young adults (aged 20–39) more often were listed with the private practice, both at the beginning and the end of the study. On 1 October 2005 the individuals listed with the public practice had significantly higher co-morbidity level than those listed with the private practice (Table I). We observed that the number of individuals with higher co-morbidity level (RUB 2-5) increased significantly at the public practice during our study (Table I).

2. Re-listing during the study

The proportion of females who remained listed with the public practice was higher than in the group who re-listed with the private practice (Table II). A higher proportion of children and individuals aged 40–59 was found in the group re-listed with the private practice (Table II). A higher proportion of older individuals (over 60 years) was found in the group which remained listed or re-listed with the public practice compared to the private practice (Table II). Individuals with the lowest co-morbidity level (RUB 0) dominated in the group that re-listed with the private practice (Table II). Individuals with higher co-morbidity level (RUB 2 and higher) were more likely to remain listed with the public practice (Table II).

The odds ratio for re-listing with the public practice increased with a higher co-morbidity level of individuals who were listed with the private practice at the beginning of our study (Table III).

Discussion

The main findings

In this study we found that a higher co-morbidity level, female gender and age above 60 years were significantly associated with higher probability of being listed with the public practice**.** A higher co-morbidity level and age were also correlated with higher probability of re-listing with the public practice. Using a measure of co-morbidity can help us understand more about the chronically ill individual's choice of healthcare provider.

Strengths and weaknesses of the study

Our data about age, gender, diagnosis codes are from electronic patient records, which ensure that all the data were included. The ACG Case-Mix system that we used has been evaluated in many countries as a valid tool to estimate co-morbidity level [15, 16].

The co-morbidity level was based only on diagnoses that individuals received at the public PHC practice during the period up to one year before the beginning of our study. Therefore differences in validity and quality of diagnoses between the private and public PHC practice did not influence the results in our study. In a study in Blekinge, about 75% of the inhabitants had at least one visit to their PHC physician during a three-year period and almost 90% of all visits had a registered diagnosis [17]. The diagnoses were not validated. During the period of this study the ACG Case-Mix system was not used for reimbursement, which makes

manipulation such as up-coding unlikely. It is more likely that some diagnoses were not registered for various reasons [18].

Distance has influence on the individual's choice of PHC physician [19, 20]. In our study individuals who were listed with both the practices lived close to their respective PHC practice. The influence of distance to the PHC physician on the individual's choice seems unlikely in our study.

The study explored differences in gender, age and co-morbidity level in individuals listed with only two PHC practices, so it is difficult to extrapolate the findings.

Patients in Sweden pay the same rates for both public- and private PHC so the economic side of the choice of PHC practice is not as important as it may be in most other countries.

Previous work

Co-morbidity is important to take into account when studying choice in PHC because the variation in co-morbidity level increases with age. ACG explained about 50 % of the variance in use of outpatient care and age and gender only 6-7 % [15,16]. Our results agree with other studies in that younger individuals re-list more often [21]. Younger patients more often want to be actively involved in medical decision-making concerning themselves [22], which may make them more active in their choices of the type of PHC practice. Younger age is generally associated with a higher mobility, but another possible explanation could be that private practices offer better accessibility, which is important for this patient group [11]. A possible explanation of the individual's listing choice could be different needs for contact with the PHC team. A study from Sweden shows that older individuals prefer to have a stable contact with one PHC physician, while individuals on the labour market prefer to list with a PHC team comprising both physicians and nurses [23]. Also, a low number of patients with higher co-morbidity listed with the private practice may be due to the fact that individuals with

higher co-morbidity chose the public practice. Individuals with higher co-morbidity level, probably having previously established good contact with the public PHC practice, chose it to guarantee stable future contact. Individuals' preferences can also relate to the doctor-patient relations [24] and patients may prefer physicians whom they have known longer and whose personal attributes and characteristics suit the patients better [25].

Conclusion

With this study we have shown that the probability of choosing a public instead of a private PHC provider increased with higher age and co-morbidity level of the individuals. Using a measure of co-morbidity can help us understand more about the chronically ill individual's choice of healthcare provider.

The importance of co-morbidity should be made visible for healthcare policy makers, so that they can make appropriate choices for improving care of elderly patients with co-morbidities, when they decide about reimbursement system or organisation of PHC.

We suggest that a patient's co-morbidity level is an important factor when studying individuals' choice of PHC provider. Further insight could be gained by further studying the reasons for listing or re-listing in individuals with different co-morbidity levels.

Competing interests

The authors declare that they have no competing interests.

Ethics

The study was approved by the Research Ethics Committee at Lund University.

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Table I. Number of individuals in public and private practice at the beginning and end of the study with respect to gender, age and level of co-morbidity.

	Public practice 2005	**Private practice 2005**		**Public practice 2006**	**Private practice 2006**	
Figure 1	A1	B1		A2	B2	
	N (%)	N (%)	p	N (%)	N (%)	p
	11223	1473		7975	3830	
Gender		***p for trend < 0.001***			***p for trend < 0.001***	
female	5437 (48.45)	579 (39.31)		3893 (48.82)	1686 (44.02)	
male	5786 (51.55)	894 (60.69)		4082 (51.18)	2144 (55.98)	
Age		***p for trend < 0.001***			***p for trend < 0.001***	
0-19	2341 (20.86)	308 (20.91)	NS	1505 (18.87)	1013 (26.45)	<0.001
20-39	2748 (24.49)	577 (39.17)	<0.001	1844 (23.12)	1061 (27.70)	<0.001
40-59	2985 (26.6)	375 (25.46)	NS	2096 (26.28)	1133 (29.58)	<0.001
60-79	2407 (21.45)	180 (12.22)	<0.001	1947 (24.41)	539 (14.07)	<0.001
over 80	742 (6.61)	33 (2.24)	<0.001	583 (7.31)	84 (2.19)	<0.001
Co-morbidity		***p for trend < 0.001***			***p for trend < 0.001***	
RUB 0	6012 (53.57)	1020 (69.25)	<0.001	3920 (49.15)	2533 (66.14)	<0.001
RUB 1	1756 (15.65)	216 (14.66)	NS	1279 (16.04)	580 (15.14)	NS
RUB 2	2150 (19.16)	196 (13.31)	<0.001	1653 (20.73)	581 (15.17)	<0.001
RUB 3	1229 (10.95)	41 (2.78)	<0.001	1056 (13.24)	132 (3.45)	<0.001
RUB 4	72 (0.64)	0	0.002	63 (0.79)	4 (0.10)	<0.001
RUB 5	4 (0.04)	0	NS	4 (0.05)	0	NS

N: Number of individuals; RUB: Resource utilisation bands; A1 -individuals listed with the public practice on 1 October 2005; A2 -individuals listed with the public practice on 1 October 2006; B1 - individuals listed with the private practice on 1 October 2005; B2 -individuals listed with the private practice on 1 October 2006; NS – not significant

Table II. Number of individuals who stayed listed with the same practice and who re-listed with the other practice during the study with respect to gender, age and level of co-morbidity.

	Public practice 2005-06	**Re-listed with private practice**		**Private practice 2005-06**	**Re-listed with public practice**	
Figure 1	A1→A2	A1→B2		B1→B2	B1→A2	
	N (%)	N (%)	p	N (%)	N (%)	p
	7715	2747		1083	260	
Gender		***p for trend 0.003***			***p for trend NS***	
female	3783 (49.03)	1256 (45.72)		430 (39.70)	110 (42.31)	
male	3932 (50.97)	1491 (54.28)		653 (60.30)	150 (57.69)	
Age		***p for trend < 0.001***			***p for trend NS***	
0-19	1449 (18.78)	776 (28.25)	<0.001	237 (21.88)	56 (21.54)	NS
20-39	1748 (22.66)	668 (24.32)	NS	393 (36.29)	96 (36.92)	NS
40-59	2039 (26.43)	833 (30.32)	<0.001	300 (27.70)	57 (21.92)	NS
60-79	1903 (24.67)	410 (14.93)	<0.001	129 (11.91)	44 (16.92)	0.03
over 80	576 (7.47)	60 (2.18)	<0.001	24 (2.22)	7 (2.69)	NS
Co-morbidity		***p for trend < 0.001***			***p for trend < 0.001***	
RUB 0	3772 (48.89)	1768 (64.36)	<0.001	765 (70.64)	148 (56.92)	<0.001
RUB 1	1239 (16.06)	420 (15.29)	NS	160 (14.77)	40 (15.38)	NS
RUB 2	1597 (20.70)	445 (16.20)	<0.001	136 (12.56)	56 (21.54)	<0.001
RUB 3	1040 (13.48)	110 (4.00)	<0.001	22 (2.03)	16 (6.15)	<0.001
RUB 4	63 (0.82)	4 (0.15)	<0.001	0	0	
RUB 5	4 (0.05)	0	NS	0	0	

N: Number of individuals; RUB: Resource utilisation bands; A1→A2-individuals who stayed listed with the public practice during the study; A1→B2-individuals who re-listed with the private practice

during the study; B1→B2-individuals who stayed listed with the private practice during the study; B1→A2 -individuals who re-listed with the public practice during the study. NS – not significant

Table III. Age-adjusted and multivariate odds ratios for re-listing with private and public practice during the study period (1 Oct 2005 – 1 Oct 2006).

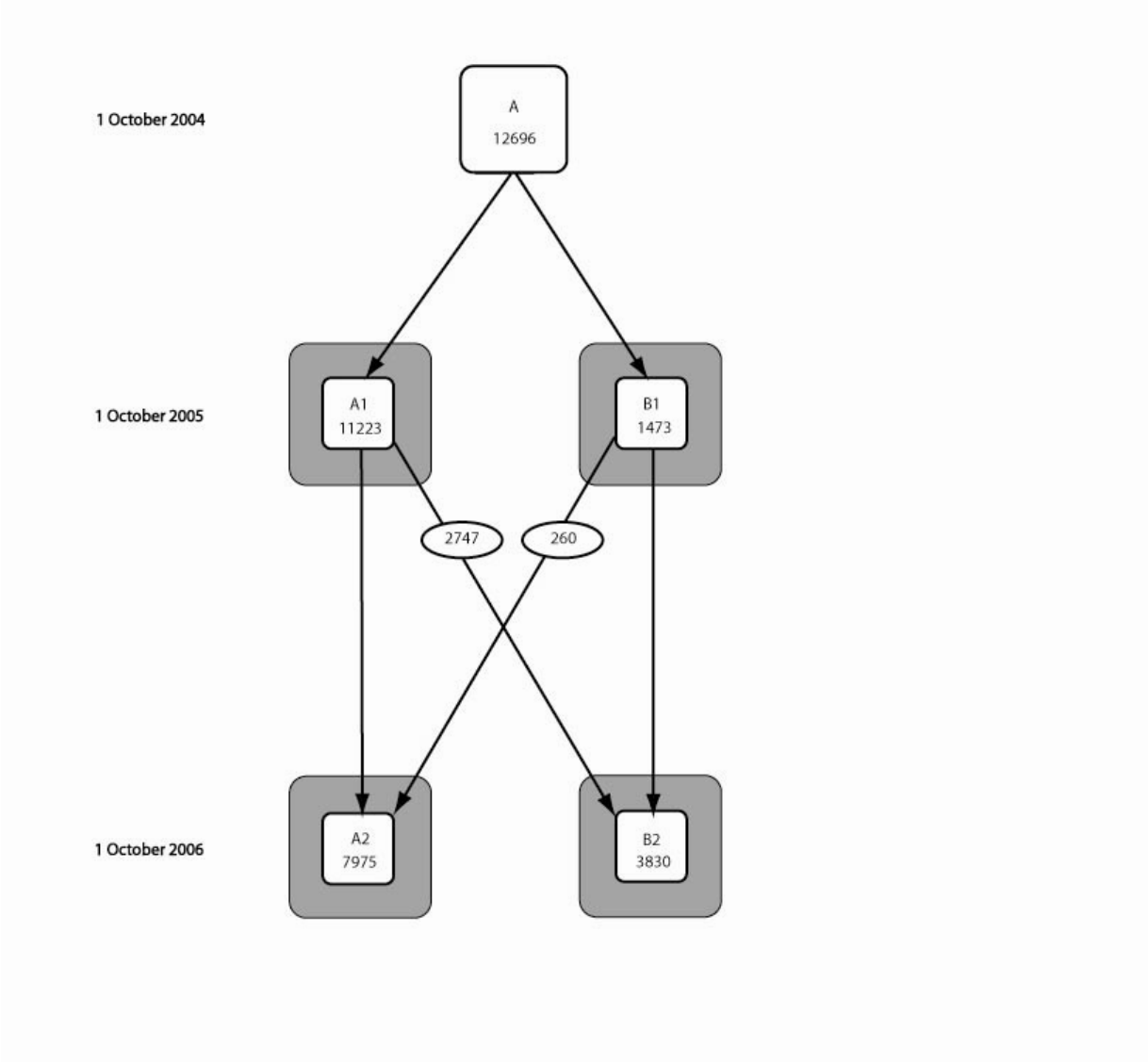
Relisting and level of co-morbidity		Age-adjusted model [1]			Fully-adjusted model[2]		
		OR	95% CI	p	OR	95% CI	p
To private practice	RUB 0	1			1		
	RUB 1	0.69	0.61-0.78	<0.001	0.70	0.61-0.79	<0.001
	RUB 2	0.62	0.54-0.70	<0.001	0.62	0.55-0.70	<0.001
	RUB 3	0.30	0.24-0.36	<0.001	0.30	0.24-0.37	<0.001
	RUB 4	0.20	0.07-0.56	0.002	0.21	0.07-0.57	0.002
	RUB 5						
To public practice	RUB 0	1			1		
	RUB 1	1.29	0.87-1.91	NS	1.29	0.87-1.91	NS
	RUB 2	2.17	1.52-3.12	<0.001	2.16	1.52-3.12	<0.001
	RUB 3	3.52	1.78-6.96	<0.001	3.52	1.78-6.98	<0.001
	RUB 4						
	RUB 5						

CI: confidence interval; RUB: Resource utilisation band; OR: odds ratio; NS: not significant

1. Adjusted only for age; 2 Adjusted for age and gender

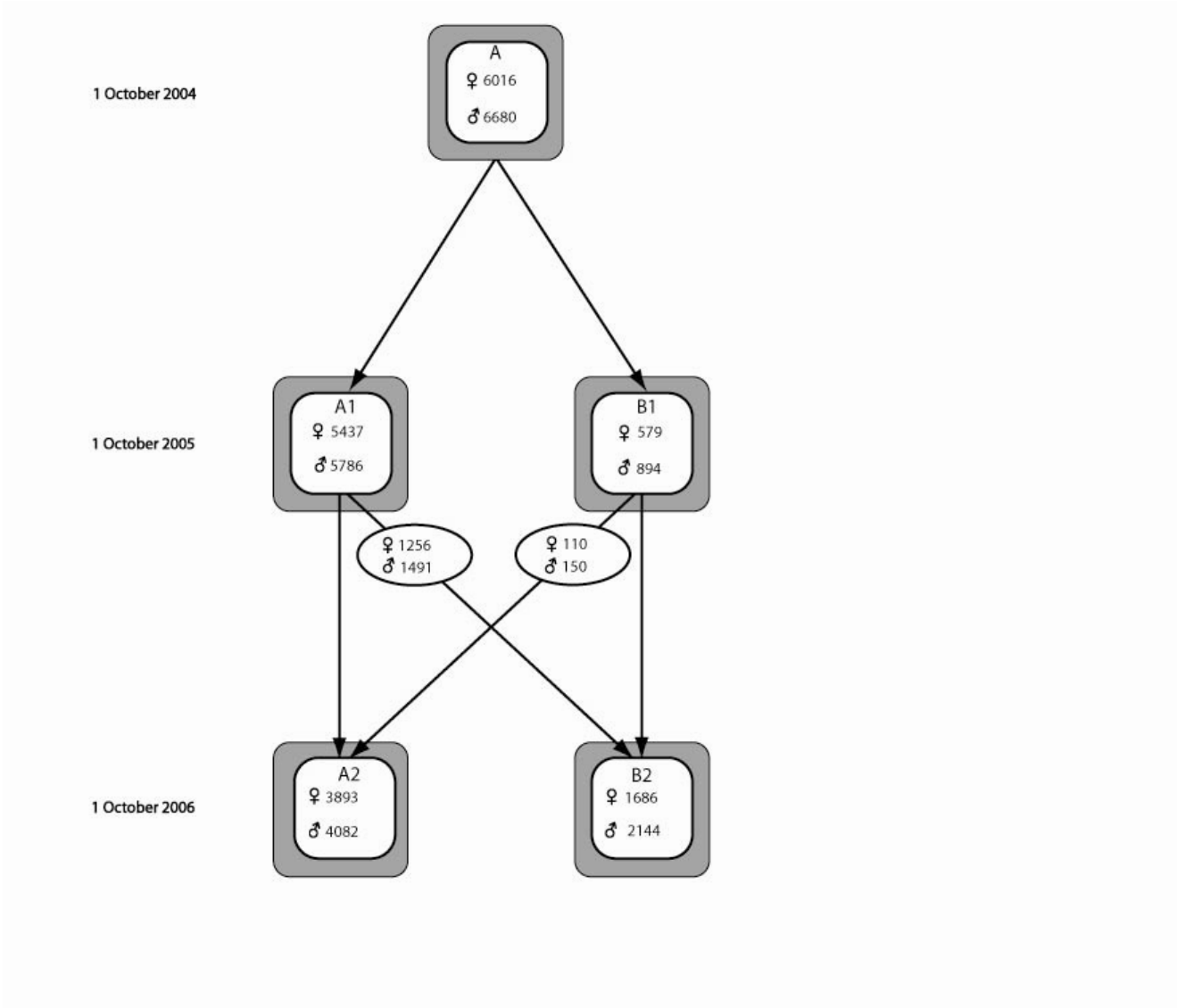
Figure

Figure 1. Flow of individuals in study cohort between PHC practices



A -individuals listed with the public practice on 1 October 2004; A1 -individuals listed with the public practice on 1 October 2005; A2 -individuals listed with the public practice on 1 October 2006; B1 -individuals listed with the private practice on 1 October 2005; B2 -individuals listed with the private practice on 1 October 2006. 891 individuals died or moved during the follow-up

Figure 2. Flow of individuals in study cohort between PHC practices with respect to gender



♀ - female; ♂ - male; A -individuals listed with the public practice on 1 October 2004;

A1 -individuals listed with the public practice on 1 October 2005; A2 -individuals listed with the public practice on 1 October 2006; B1 -individuals listed with the private practice on 1 October 2005; B2 -individuals listed with the private practice on 1 October 2006