Development of risk adjusted capitation payment system for Hungarian Managed Care Organizations

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Introduction

Risk adjustment is defined as the use of information to calculate the expected health expenditures of individual consumers over a fixed interval of time and set subsidies to consumers or health plans to improve efficiency and equity. In the Hungarian Managed Care pilot Program, health plans are allocated an annual budget (based on capitation) from the National Health Insurance Fund Administration (NHIFA). They are required to purchase health care for everybody within their area of jurisdiction. There is likely to be a large degree of diversification concerning the demographic and socio-economic structure of numerous regionally defined populations. Therefore, for on grounds of *equity*, it is appropriate for NHIFA to adjust the resource allocation to health plans on the basis of population characteristics that proxy health care need.

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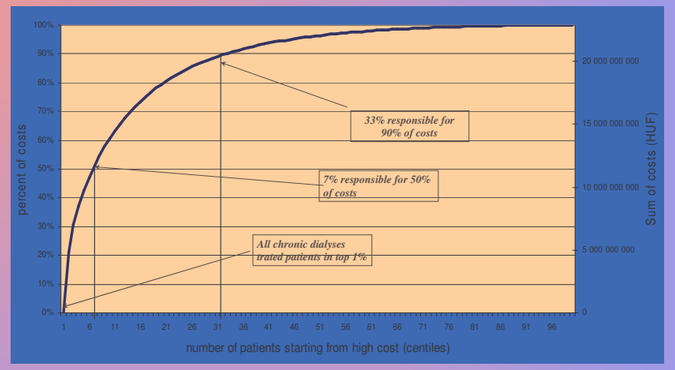
Table 1 :
The 16 cells of the capitation payment formula with adjusting only for age and sex

Age	Gender	GP	Dental Care	Out patient Care	CT/MRI Diagnostic	Dialyser Treatment	Home Care	Inpatient Care	Inpatient Care Longterm	Drug Reimbursement	Medical Devices	Spa Treatment
0 - 4	Male	578,50	13,69	304,08	10,17	0,07	0,64	2732,77	2,14	787,76	187,36	0,64
	Female	577,87	13,50	265,09	7,74	0,54	0,54	2322,77	3,76	787,76	187,36	0,64
	Year	*578,19*	*13,60*	*285,11*	*8,99*	*0,30*	*0,59*	*2533,50*	*2,93*	*787,76*	*187,36*	*0,64*
5 - 14	Male	385,59	152,05	242,12	17,29	2,11	0,45	552,25	10,49	452,49	187,36	6,76
	Female	385,90	178,94	223,50	18,99	0,60	0,52	465,03	9,11	452,49	187,36	6,76
	Year	*385,74*	*165,19*	*233,02*	*18,12*	*1,37*	*0,49*	*509,62*	*9,81*	*452,49*	*187,36*	*6,76*
15 - 34	Male	171,41	68,36	236,33	29,79	27,98	1,10	480,95	48,24	436,98	187,36	3,81
	Female	176,06	91,28	444,69	41,52	19,66	0,86	1004,96	33,32	436,98	187,36	3,81
	Year	*173,69*	*79,58*	*338,31*	*35,53*	*23,99*	*0,98*	*737,42*	*40,94*	*436,98*	*187,36*	*3,81*
35 - 50	Male	222,28	52,86	328,66	76,35	93,61	3,64	1253,15	184,52	1011,08	187,36	22,09
	Female	227,15	69,20	546,74	94,43	56,15	4,82	1320,01	121,65	1011,08	187,36	22,09
	Year	*224,75*	*61,16*	*439,38*	*85,15*	*74,59*	*4,24*	*1287,09*	*152,60*	*1011,08*	*187,36*	*22,09*
51 - 60	Male	232,08	70,60	504,44	104,96	172,47	11,53	2251,56	290,46	2106,66	187,36	56,87
	Female	234,12	84,61	696,59	89,34	121,51	12,80	1740,90	181,29	2106,66	187,36	56,87
	Year	*233,17*	*78,13*	*607,75*	*96,56*	*145,67*	*12,21*	*1977,00*	*231,76*	*2106,66*	*187,36*	*56,87*
61 - 70	Male	342,22	101,39	560,67	113,51	241,21	25,98	3430,49	335,68	3031,87	187,36	69,41
	Female	344,40	95,05	618,24	83,07	172,26	24,77	2518,07	271,76	3031,87	187,36	69,41
	Year	*343,49*	*97,69*	*594,24*	*96,59*	*201,00*	*25,28*	*2898,88*	*298,40*	*3031,87*	*187,36*	*69,41*
71 - 80	Male	353,94	80,39	651,47	102,95	289,78	45,47	4130,55	451,95	4146,67	187,36	56,88
	Female	357,52	56,65	585,98	64,32	200,27	53,39	3222,16	537,73	4146,67	187,36	56,88
	Year	*356,22*	*65,26*	*609,74*	*78,33*	*232,74*	*50,52*	*3551,71*	*506,61*	*4146,67*	*187,36*	*56,88*
81 -	Male	329,25	43,91	572,97	59,35	143,23	82,81	4631,82	898,06	4021,56	187,36	26,55
	Female	334,45	22,68	363,99	38,74	83,28	91,92	3638,75	1395,85	4021,56	187,36	26,55
	Year	*332,90*	*29,03*	*426,49*	*44,91*	*101,71*	*89,19*	*3935,78*	*1246,96*	*4021,56*	*187,36*	*26,55*
Sum	**Male**	**266,94**	**75,78**	**346,88**	**58,23**	**88,30**	**8,26**	**1495,57**	**157,45**	**1244,35**	**187,36**	**23,06**
	Female	**275,37**	**87,28**	**492,77**	**61,38**	**70,32**	**12,63**	**1588,49**	**173,02**	**1475,01**	**187,36**	**26,68**
	Sum	**271,35**	**81,79**	**423,13**	**59,88**	**78,90**	**10,54**	**1544,13**	**165,59**	**1364,90**	**187,36**	**24,95**

(values in HUF for one-month-period)

The 16 cells used for the age-sex formula

Figure 1:
Concentration of high cost beneficiaries in the Managed Care Pilot Program's population



Studied population: 486 432
Number of chronic dialyses treated patients in the top 1%: 204
Year: 2002

Table 2:
Regression results after adjusting for chronic dialyser condition retrospecively

Method: Least Squares		*number of*	*number of*
Payment model	*R-square*	*observations*	*cells*
age-sex	0,0483	486432	16
age-sex-dummy	0,1879	486432	32

Studied population: 486 432
Year: 2002

Table3:
Results with age-sex model and new dialysis dummmy for the different type of services

Type of service			Dental Care	Ouppatient Care	Inpatient Care	Inpatient Care Long Term	Dialyser Treatment	CT/MRI Diagnostic	Home Care	Drug Reimbursement	Medical Devices	Spa Treatment
Number	Observations		120843	314513	65056	6181	276	13601	1633	358825	53580	10960
	Chronic Dialysis treated patients		31	204	137	15	204	25	7	203	78	1
Variable Type	AGE-SEX-DUMMY	coefficient	-1409,85	49950,78	157800,90	-87116,95	203721,00	-2053,09	49935,33	92982,58	-4498,70	-2584,15
		t value	-1,50	60,78	10,41	-1,67	13,16	-0,53	3,85	16,70	-0,91	-0,27
		P value	0,13	0,00	0,00	0,10	0,00	0,60	0,00	0,00	0,36	0,79
	AGE	coefficient	39,80	68,23	1620,37	77,07	-111,16	-38,71	204,59	576,31	168,22	81,06
		t value	52,98	70,48	52,86	0,51	-0,25	-3,89	4,34	100,21	20,47	13,64
		P value	0,00	0,00	0,00	0,61	0,80	0,00	0,00	0,00	0,00	0,00
	SEX	coefficient	549,10	2162,27	-31487,83	-7924,01	-2262,03	159,89	-657,95	-185,16	-4501,40	-173,59
		t value	18,17	50,99	-22,10	-1,51	-0,16	0,47	-0,37	-0,69	-11,52	-0,92
		P value	0,00	0,00	0,00	0,13	0,87	0,64	0,71	0,49	0,00	0,36
Payment model	AGE-SEX	R-square	0,0263	0,0258	0,0484	0,0004	0,0046	0,0011	0,0114	0,0276	0,0093	0,0167
	AGE-SEX-DUMMY		**0,0263**	**0,0371**	**0,0500**	**0,0008**	**0,3920**	**0,0012**	**0,0203**	**0,0283**	**0,0093**	**0,0167**

Studied population: 486 432
Year: 2002

Objective

The pilot program's capitation formula is weighted by age and sex (Table 1) that provides a small predictive power for costs: R-square is 4,83%. Meanwhile a small proportion of population is overwhelmingly responsible for the majority of costs (Figure 1). Discovering this high risk population for risk adjustment purposes is desirable. Finding new determinants – in addition to age and sex – which proxy health care need are presumed to be patients' previous year history, geographical and social specifics and disability.

Methods

Primary utilization data are obtained from the NHIFA and its fellow institutions. The studied population consists of the pilot program's 486,432 beneficiaries.
With the linked use of the different provisions' utilisation data in order to identify high cost chronicle condition beneficiaries, chronic dialysis treated clients had been selected. The identification of the target group for each month was based on previous 3 month history. Afterwards chronic dialysis treatment as a risk factor (dummy variable) was added to the model. Two-part model for health spending and linear regression were used to measure the explanatory power.

Findings

In the studied population 204 beneficiaries were affected. They all belonged to the upper 1 % of high cost patients. After allowing for chronic dialysis treatment R-square ratio increased by 13,96% to 18,79% (Table 2). Results with using the same set of adjusters for the different type of services are shown in Table 3.
The result might be surprising for the first glance, but bear in mind that the new chronic dialysis dummy was added *retrospectively*. Therefore, the significant a increase in the explanatory power of the prospective model with adding one retrospective element to the formula is understandable.

Conclusions

Results show that adaptation of risk adjustment methods into Hungarian health care has a good reason. The use of retrospective elements in a prospective model have been able to reasonably increase the predictive power. However, they should only be applied when resulting right incentives for the devolved units. Accomplishing the adequate combination of foreign and Hungarian methods is the designated way. Further investigations highlight on patients' previous year history and socio-economical specifics. According to the international experience several years of research is needed to develop the appropriate model.

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NHIFA