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# **Patients Whose GP Knows Complementary Medicine Have Lower Costs and Live Longer**

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## **Abstract**

A small fraction of general practitioners (GPs) in the Netherlands has completed additional training in complementary medicine after obtaining their conventional medical degree. Using a data set from a health insurer, this paper documents that patients whose GP has additional training in anthroposophic medicine, homeopathy, or acupuncture have substantially lower health care costs and lower mortality rates. The lower costs result from fewer hospital stays and fewer prescription drugs. Since the differences remain once we control for neighborhood specific fixed effects at a highly detailed level, the lower costs and longer lives are unlikely to be related to differences in socio-economic status. Possible explanations are selection (e.g. people with a low taste for medical interventions might be more likely to choose CAM) and better practices (e.g. less overtreatment, more focus on preventive and curative health promotion) by GPs with knowledge of complementary medicine.

Keywords: health care costs, life expectancy, complementary medicine.

JEL classification: I11, I12.

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## 1. Introduction

Health economists have largely ignored complementary and alternative medicine (CAM) as an area of research, a fact possibly related to the low esteem of CAM in the medical profession. At the same time, however, patients around the globe are increasingly embracing CAM as a contributor to health. A recent study by the US National Institute of Health shows that 4 out of 10 Americans used some form of CAM in 2007<sup>1</sup>. In a referendum in Switzerland in 2009, two thirds of the voters were in favor of a wider coverage of CAM by public health insurance.

By definition, the effectiveness of complementary and alternative medicine has not been proven in clinical trials (e.g., Sing and Ernst, 2008).<sup>2</sup> However, lack of proof of effectiveness is obviously not the same as proof of ineffectiveness. Clearly, the status of a treatment can change from CAM into conventional medicine once scientific evidence on effectiveness becomes available. Two examples of CAM treatments that have become (more) accepted by conventional medicine are Sint John's wort and acupuncture for specific indications. Sint John's wort has become part of the conventional guidelines for the treatment of depression, based on scientific evidence from randomized controlled trials (Linde et al, 2009). Hopton and McPherson (2010) conclude on the basis of a systematic review of pooled data from meta-analyses that acupuncture is more than a placebo for commonly occurring chronic pain conditions. Also Servan Schreiber (2005) presents a series of recent examples of the transition from CAM to conventional medicine in depression treatment. Some of the methods described by Servan Schreiber have been practiced for centuries, cannot be patented, and are available at low costs. These findings underscore the fact that methods that are considered CAM today could be effective and have a large cost-savings potential.

In this paper, we compare the performance of general practitioners who have completed certified additional training in complementary medicine after obtaining their conventional medical degree (GPCs) with general practitioners who have not (GPs).

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<sup>1</sup> [nccam.nih.gov/news/camstats/2007](http://nccam.nih.gov/news/camstats/2007)

<sup>2</sup> The US National Institute of Health uses the alternative definition "CAM is a group of diverse medical and health care systems, practices, and products that are not generally considered part of conventional medicine".

More specifically, we consider GPCs with additional training in anthroposophic medicine (about 2 percent of general practitioners), homeopathy (about 1 percent), or acupuncture (about 1 percent).

Using a large data set from a health insurer we find substantial and significant differences between the health care costs and mortality rates of patients who have a conventional GP and patients who have a GPC. Costs are lower because of both lower pharmaceutical and lower hospital costs. In some cases the cost difference is as large as 30 percent. Since the differences remain once we control for neighborhood specific fixed effects at highly detailed level, the lower costs and longer lives are unlikely to be related to differences in socio-economic status. We argue that the differences are likely to be due to both selection on unobservables (healthier patients or patients with a low taste for medical interventions might be more likely to prefer a GPC) and better practice on the part of the GPCs (more focus on preventative and curative health promotion, less overtreatment).

## **2. The institutional setting**

Anthroposophic medicine, acupuncture and homeopathy are three main streams of Complementary and Alternative Medicine (CAM). One of the core features of CAM is its orientation on preventative and curative health promotion as an additional approach to a more conventional fighting disease approach. Anthroposophic medicine is an integrative diagnosis and therapy concept, developed from 1921 onwards and practiced today in over 60 countries. It combines mainstream scientific medicine with Rudolf Steiner's anthroposophy. Anthroposophic medicine considers a human being as a whole entity - body, mind, soul and individuality. It aims to stimulate the self-healing forces of the body, restoring the balance of bodily functions and strengthening the immune system, rather than primarily relieve the symptoms of disease. Specific anthroposophic approaches include anthroposophic medicinal products, massage therapy, art and music therapy, and speech and movement therapies (e.g., [www.iva.info](http://www.iva.info)).

Acupuncture is one of the main forms of treatment in traditional Chinese medicine. It involves the use of sharp, thin needles that are inserted in the body at very

specific points. This process is believed to adjust and alter the body's energy flow into healthier patterns, and is used to treat a wide variety of illnesses and health conditions (e.g., <http://nccam.nih.gov/health/acupuncture/introduction.htm>).

Homeopathy is a form of alternative medicine, first proposed by German physician Samuel Hahnemann in 1796, that attempts to treat patients with heavily diluted substances. These substances which cause certain symptoms in healthy individuals are given as the treatment for patients exhibiting similar symptoms. The appropriate homeopathic medicinal product aims to stimulate the body's inherent forces of self-recovery (see e.g., [www.echamp.be](http://www.echamp.be)).

In their review, Herman et al. (2005) report that some studies indicate that CAM therapies may be considered cost-effective compared to usual care for various conditions: acupuncture for migraine, manual therapy for neck pain, spa therapy for Parkinson's, self-administered stress management for cancer patients undergoing chemotherapy, pre- and post-operative oral nutritional supplementation for lower gastrointestinal tract surgery, biofeedback for patients with 'functional' disorders (eg, irritable bowel syndrome), and guided imagery, relaxation therapy, and potassium rich diet for cardiac patients. A systematic review of randomized clinical trials on the use of so-called Natural Health Products shows evidence of cost effectiveness in relation to postoperative surgery but not with respect to the other conditions assessed (Kennedy et al., 2009).

GP care varies between European countries in terms of structure, working methods, and responsibilities. In the Netherlands GPs are the central gatekeepers for reference to the rest of healthcare, like specialists and paramedics. Dutch general practitioners generally receive a quarterly fixed fee per patient plus a fee-for-service per consultation and per drug prescription. There is no difference between the financial incentives faced by GPs and GPCs. In the Netherlands purchasing basic health insurance is mandatory for all citizens. In addition, citizens are free to purchase supplementary insurance.

### 3. Empirical analysis

The empirical analysis is based on data from health insurer Azivo, active primarily in the city of Hague and its wider vicinity.<sup>3</sup> Azivo's share in the market for basic and supplementary health insurance in this region is about one quarter. The data set contains quarterly information on the health care costs of all approximately 150,000 Azivo insurees for the years 2006 up to 2009. In addition, it contains the date of birth of the insuree, date of death (if applicable), gender, and 6-digit postcode of the insuree's residence. For each insuree-quarter combination, information on the costs of four different types of care are available: care by GP, hospital care, pharmaceutical care, and paramedic care (like physical therapy). While the data set does not contain information on the supplementary insurance *status* of insurees, the cost information is the sum of expenses covered by both the basic and (if applicable) supplementary health insurance.

The data set also contains the names and addresses of the about 2000 GPs who have patients who are insured by Azivo, which allows us to distinguish between conventional GPs and GPCs. We define a general practitioner as anthroposophic GPC if his or her name appears in the list of general practitioners with additional training in anthroposophic medicine as provided by their professional association ([www.nvaa.nl](http://www.nvaa.nl)). GPCs with homeopathy ([www.vhan.nl](http://www.vhan.nl)) and GPCs with acupuncture ([www.acupunctuur.com](http://www.acupunctuur.com)) are defined similarly.

Table 1 summarizes the data. The first row contains the key comparison, and shows that the costs of patients with a GPC are 7 percent lower compared to conventional GPs. On annual basis, this amounts to 170 Euros per patient. This difference results from lower hospital and pharmaceutical costs. Patients with a GPC have slightly higher costs for paramedic care, but this difference is small. Table 2 compares the costs by age group. In absolute terms, the differences are particularly large for patients aged 75 and above with an anthroposophic GPC (more than 1000 Euros on an annual basis).

Table 1 also shows that large demographic differences between patients with a conventional GP versus patients with GPCs. GPCs have a larger fraction of female

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<sup>3</sup> Azivo is a former *Ziekenfonds* (sick fund) founded in 1895. It merged with health insurer Menzis in 2008, but keeps operating as "Azivo" in the the Hague region.

patients than GPs and fewer patients from disadvantaged neighborhoods.<sup>4</sup> Similar results have been reported by Ness et al. (2005) for the US and Esch et al. (2008) for Switzerland. Clearly, the costs differences reported in tables 1 and 2 are likely to be partly due to differences in the demographic composition of the various groups of patients.

To control for these effects, table 3 reports regressions results. Each row is based on two regressions with either costs (left panel) or the natural logarithm of costs (right panel) as the dependent variable. In all regressions, the explanatory variables are: gender, age (linear, within each age category), dummies for each quarter, dummies for anthroposophy, homeopathy, and acupuncture, and 6-digit postal code fixed effects. The table reports the coefficients on the dummies for anthroposophy, homeopathy, and acupuncture. Standard errors clustered at the insuree level.

The left panel of table 3 shows that for patients in the age group 25 to 49 with a GPC with acupuncture total costs are 66 euro lower per quarter. Secondly, for patients aged 75 and above with an anthroposophic GP total costs are about 400 Euros lower per quarter. The magnitude of this difference is large, about one third lower. The separate regressions for the costs components show that these lower costs come from lower hospital and lower pharmaceutical costs. The results for the loglinear specification show a somewhat different pattern. Homeopathic GPCs have about 15 percent lower costs in all three age categories below age 75. The lower costs for patients aged 25-49 who have a GPC with acupuncture is found again for the loglinear specification. The differences between the linear and loglinear results are related to the fact the two specifications focus on different aspects of the cost distributions. The linear specification measures differences in the means of the costs distributions, while the loglinear specification is informative about the difference in medians.<sup>5</sup>

Overall, the results provide strong evidence of substantially lower costs for general practitioners who have additional training in complementary medicine. It is important to note that 6-digit postal codes in the Netherlands are highly detailed, representing on 16 households on average. Within such a code households are highly

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<sup>4</sup> We follow a government list of most disadvantaged neighborhoods in the Netherlands (“Vogelaarwijken”). These neighborhoods are uniquely identified by their 4-digit postal code.

<sup>5</sup> If  $\ln(y) = X'\beta + \varepsilon$  with  $\varepsilon$  following a normal distribution with zero mean, then  $\text{med}(y) = X'\beta$ .

homogeneous in terms of socio-economic status. Given that we have controlled for 6-digit postal codes in the regressions, the results are unlikely to be due to differences in socio-economic status.

Note that insurees interested in complementary medicine are more likely to buy supplementary insurance since CAM is not covered by basic health insurance. This would imply that the marginal out-of-pocket expenses for these insurees are lower than for insurees with a conventional GP, leading to more consumption of health care. Yet, we find that the costs of patients with a GPC are lower. This suggests that if we could control for the endogeneity of the supplementary insurance decision (with additional data), the estimated cost differences might be even larger.

Finally, several studies that compare the health status of patients treated in CAM and in conventional medicine in primary care settings find that patients treated in CAM practices suffer more often from severe and chronic illnesses (e.g., Esch et al, 2008; Florica et al, 2009). This suggests that if we could control for severity and chronicity of illnesses (with additional data), the estimated cost differences might be even larger.

#### **4. Discussion**

There are three types of explanations for the differences reported in the previous section. First, the differences could be due to selection on unobservables in patients' GP choice. For example, patients who are healthier and more health-conscious, or patients with a strong preference to minimize exposure to medical interventions might be more likely to choose a GPC. In both cases costs will be lower due to lower demand for health care. A standard approach to control for selection on unobservables is to use instrumental variables. A potential instrumental variable (IV) in this case is the distance between a patient's home and the various GPs. However, the distance measures would be perfectly correlated with the 6-digit postal code dummies. As a consequence, this IV would only work if we would control for less detailed neighborhood information, like 4-digit postal codes. However, since socio-economic differences within a 4-digit postal code are typically large, this would not be a credible approach for identifying a causal effect of CAM on costs.



Second, the results could be due to undertreatment by GPCs. Investigating this explanation requires data on outcomes. In the present data set the only outcome information available is mortality in the years 2006 up to and including 2009. For the population of insurees in our data, the mortality rate was approximately 4 percent. Table 4 reports the results of an analysis of mortality rates. The table shows that – controlling for demographics (including age) and postal codes patients with a GPC have lower mortality rates. (Note that lower mortality rates at all ages implies a higher life expectancy.) A number of studies have reported that patients seeking anthroposophic or homeopathic care have longer lasting and more severe health problems than patients in conventional care. At the same time, these patients report fewer adverse side effects of treatments and higher patient satisfaction; see, for example, Esch et al. (2008) and Florica et al. (2008). These findings combined with the results in table 4 suggest that undertreatment by GPCs is unlikely.

Thirdly, the results could be due to better practices of CAM due to a stronger focus on preventive and curative health promotion and less overtreatment. For example, a GPC might try a low cost CAM treatment first. As mentioned, the primary professional orientation of CAM doctors is to strengthen the self-healing capacity of the body. This approach is associated with prescribing fewer conventional pharmaceuticals, tests, and operations.

A large number of issues remain for future research. We mention three of them. First of all, replication studies based on similar data sets are needed to confirm the present results. Secondly, further research based on more comprehensive data is needed to determine to what extent selection on unobservables and causal effects explain the lower costs and lower mortality rates of patients with a GPC. Thirdly, more research is needed with regard to the cost-effectiveness of CAM for specific diagnostic categories.

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Table 1. **Descriptive statistics**

<i>Costs of health care</i> (euros per quarter)	Conventional GP	GP with anthroposophy	GP with homeopathy	GP with acupuncture
Total	<b>515</b>	<b>479</b>	<b>485</b>	<b>480</b>
GP	32	33	31	32
Hospital	266	236	251	235
Pharmaceutical	209	197	192	206
Paramedic	9	13	10	8
<i>Incidence of costs of health care (0/1)</i> (per quarter)				
GP	1	1	1	1
Hospital	0.29	0.28	0.26	0.30
Pharmaceutical	0.68	0.67	0.62	0.65
Paramedic	0.04	0.06	0.04	0.04
Hosp., Pharma, and/or Paramedic	0.72	0.71	0.66	0.69
<i>Insuree characteristics</i>				
Female (fraction)	0.53	0.57	0.56	0.54
Birth year (average)	1969	1970	1965	1966
Disadvantaged neighborhood (fraction)	0.22	0.09	0.07	0.04
Number of insurees	151,955	3273	1182	1469
Number of GPs	1257	26	28	25

Table 2. Costs of health care; by type of GP and insuree age

<i>Costs of health care</i> (euros per quarter)	Conventional GP	GP with anthroposophy	GP with homeopathy	GP with acupuncture
<b>Age 0-24</b>				
Total	<b>215</b>	<b>190</b>	<b>275</b>	<b>191</b>
GP	26	26	24	25
Hospital	103	85	153	96
Pharmaceutical	77	69	88	62
Paramedic	8	11	10	8
<b>Age 25-49</b>				
Total	<b>372</b>	<b>418</b>	<b>286</b>	<b>296</b>
GP	28	31	25	26
Hospital	186	201	156	146
Pharmaceutical	155	180	103	122
Paramedic	4	7	3	1
<b>Age 50-74</b>				
Total	<b>824</b>	<b>752</b>	<b>614</b>	<b>687</b>
GP	37	39	35	35
Hospital	432	382	270	324
Pharmaceutical	342	311	294	317
Paramedic	12	19	14	11
<b>Age 75+</b>				
Total	<b>1337</b>	<b>1088</b>	<b>1309</b>	<b>1139</b>
GP	57	57	59	56
Hospital	727	576	820	595
Pharmaceutical	527	426	403	466
Paramedic	27	30	27	21

Table 3. Effects of complementary care on costs

<i>Costs of health care</i> (Euros per quarter)	Linear			Loglinear		
	dummy for GP with anthro- posophy	dummy for GP with homeo- pathy	dummy for GP with acupunc- ture	dummy for GP with anthro- posophy	dummy for GP with homeo- pathy	dummy for GP with acupunc- ture
<b>Age 0-24</b>						
Total	<b>6</b>	<b>100</b>	<b>-32</b>	<b>0.016</b>	<b>-0.138**</b>	<b>-0.052</b>
GP	1	-2*	1	0.015	-0.043*	0.019
Hospital	3	76	-5	0.064	-0.153*	-0.034
Pharmaceutical	1	25	-27	-0.078*	-0.250***	-0.108
Paramedic	2	0	-1	0.048	-0.006	-0.008
<b>Age 25-49</b>						
Total	<b>14</b>	<b>-50</b>	<b>-66*</b>	<b>0.022</b>	<b>-0.160**</b>	<b>-0.106**</b>
GP	2***	-3***	0	0.030**	-0.045**	-0.004
Hospital	3	4	-47**	0.008	-0.161**	-0.135**
Pharmaceutical	8	-51**	-17	-0.035	-0.365***	-0.136*
Paramedic	1	-1	-2***	0.032	-0.029	-0.060***
<b>Age 50-74</b>						
Total	<b>63</b>	<b>-48</b>	<b>-2</b>	<b>-0.030</b>	<b>-0.153**</b>	<b>-0.084</b>
GP	4***	0	0	0.040*	-0.001	0.017
Hospital	60	-121	-64	0.032	-0.145	-0.073
Pharmaceutical	-7	69	61	-0.204***	-0.352***	-0.162
Paramedic	6*	4	1	0.080	0.016	-0.009
<b>Age 75+</b>						
Total	<b>-405**</b>	<b>81</b>	<b>214</b>	<b>-0.130</b>	<b>0.077</b>	<b>0.184</b>
GP	-2	6	7	-0.030	0.058	0.111
Hospital	-263**	52	87	-0.029	0.069	0.171
Pharmaceutical	-125*	31	127	-0.169	0.048	0.196
Paramedic	-15	-8	-7	-0.106	-0.085	0.034

Each row is based on two regressions with either costs (left panel) or the natural logarithm of costs (right panel) as the dependent variable. Explanatory variables are: gender, age (linear, within each age category), dummies for each quarter, dummies for anthroposophy, homeopathy, and acupuncture; the table reports the coefficients on the latter dummies. All regressions control for 6-digit insuree postcode fixed effects; standard errors clustered at the insuree level. \*\*\*, \*\*, \* indicate a statistically significant difference with Conventional GP at the 1, 5, 10 percent level, respectively.

Table 4. **Effects of complementary care on mortality**

	dummy for GP with anthroposophy	dummy for GP with homeopathy	dummy for GP with acupuncture	Combined
Logit with fixed effects	0.031	-0.198	-0.333*	-0.128
LPM with fixed effects	-0.005*	-0.004	-0.009**	-0.006***
<b>Women</b>				
Logit with fixed effects	0.034	0.010	-0.203	-0.031
LPM with fixed effects	-0.007*	0.004	-0.008	-0.005*
<b>Men</b>				
Logit with fixed effects	0.020	-0.627*	-0.493	-0.291*
LPM with fixed effects	-0.003	-0.014	-0.013**	-0.008**

Dependent variable: death in 2006, 2007, 2008, or 2009. The table is based on models with the following explanatory variables: gender, age, dummies for anthroposophy, homeopathy, and acupuncture (dummy for complementary in the last column); the table reports the coefficients on the latter dummies. LPM regression controls for 4-digit insuree postcode fixed effects. \*\*\*, \*\*, \* indicate a statistical significance at the 1, 5, 10 percent level, respectively. Number of observations: 155,837.