

# Attitudes towards vaccination: users of complementary and alternative medicine versus non-users

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## Summary

**Principles:** Children whose parents use complementary and alternative medicine (CAM) often show a lower rate of vaccination than those of parents favouring conventional medicine. We have investigated whether this applies to the paediatric patients presenting to an emergency department in German-speaking Switzerland, where popularity of CAM is rather high.

**Methods:** A cross-sectional survey was performed of paediatric patients presenting to an urban, tertiary paediatric emergency department. 1007 (63%) of the distributed 1600 questionnaires were available for analysis.

**Results:** 12.7% of all respondents reported refusing some basic vaccination: 3.9% because of recommendation of the physician, 8.7% despite their physician's recommendation. Socio-demographic characterisation of the group of patients refusing vaccination showed older age of children, higher proportion of girls, more single-mothers families and decreased household income. Refusal of basic vaccination was significantly more frequent among CAM-users than among non-users

(18.2% versus 3.5%,  $p < 0.001$ ). The highest frequencies of refusal were reported by patients who consulted physicians practicing herbal medicine, anthroposophical medicine or homeopathy. Users and non-users of CAM however, showed comparable rates of immunisation in the case of the vaccinations against invasive meningococcal, pneumococcal disease and flu. Surprisingly, the rate for vaccination against tick-borne encephalitis was higher in the CAM-users group than among the non-users (21.2% versus 15.4%,  $p < 0.05$ ).

**Conclusions:** A considerable proportion of the study population did not fully accept basic vaccinations. Refusal to follow the basic vaccination schemata was more frequent among CAM-users than non-users and reflected in most cases parental wishes rather than physicians' recommendations.

**Key words:** complementary and alternative medicine; herbal drugs; homeopathy; vaccination; paediatric emergency medicine

## Introduction

Complementary and alternative medicine (CAM) can be defined as a group of diverse medical and health care systems, practices and products, which are not considered to be part of "mainstream" or conventional medicine. Our previous work showed that the majority (58%, 665 out of 1143) of the paediatric patients presenting to an urban, tertiary paediatric emergency department had used some form of CAM-therapy [1]. Furthermore, 50% of all respondents used CAM as self-medication and half of the families that used CAM did not even discuss this with their general practitioner.

Previous studies revealed an inverse association between the use of CAM and the rate of vac-

ination, for instance in the case of flu vaccination of elderly [2] and school immunisation of children [3]. Furthermore, the opinions of CAM-professionals on vaccinations vary and several of them advise patients to use only some vaccines [4-8].

In Switzerland there is an intense ongoing discussion about vaccines, in part due to a recent outbreak of measles, which is the largest since the introduction of mandatory notification for this disease in 1999 and affects mainly non-vaccinated children [9]. Although only one virus variant is responsible for this national outbreak, there exist partially overlapping local clusters, which have been suggested to correspond to communities of people preferring CAM [9].

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In the present work, the vaccination rates of paediatric patients presenting to an urban, tertiary paediatric emergency department (Zurich, Switzerland) have been investigated using detailed questionnaires. Since the respondents also delivered information on their attitudes towards CAM, the correlation between refusal of basic

vaccination and CAM use could be directly assessed. Moreover, the attitudes of the respondents towards some recommended complementary vaccination and vaccination for persons at risk have been addressed. Taken together, our data shed some light on the parental decisions behind basic vaccination refusal.

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## Patients and methods

The study characteristics have been described in detail elsewhere [1]. In brief, the study was an analytical cross-sectional survey of the patients presenting to the paediatric emergency department of the University Children's Hospital of Zurich, in Switzerland. The study, which had been approved by the Hospital Ethical Review Board, was undertaken between October 2006 and March 2007. German, English, French and Italian versions of the patient information sheet, consent form and questionnaire were available. The questionnaire was completely anonymous. Exclusion criteria were: 1) previously filled-in questionnaire, 2) inability to read or write German, English, French, and Italian, 3) resuscitation/emergency patients, 4) children unaccompanied by a parent or another carer, and 5) patients with emotional issues such as child abuse or psychiatric problems. A multiple choice questionnaire consisting of 34 multiple-choice questions was used; an online version of the questionnaire is available for authorised users [1].

The questionnaire contained one section about how the children were vaccinated, with the possibility to mark with a cross one or more of the following statements: a) the paediatrician vaccinated the child as it is common in Switzerland, b) the physician advised us to refuse some vaccines, c) we have decided against some vaccines although the physician has recommended them, d) the child has already received one flu-vaccination, e) the child

is vaccinated against tick-borne encephalitis, f) the child is vaccinated against pneumococcal disease, and g) the child is vaccinated against meningococcal disease. It is important to note that the respondents only had to say whether the physician had vaccinated the child as common in Switzerland with no discrimination among the various basic vaccines being performed. In this way, the influence of the age of the children (and associated vaccines) on the answer of the parents could be minimised. Questionnaires returned with less than 50% of the questions answered or with no answers to the specific questions of vaccination were excluded from the analysis. The remaining survey results were entered into a computerised database using Remark Office OMR 6.0.4 (Gravic Inc., Malvern PA, USA). Data entry was performed using a Microsoft Excel database and all data were analysed using SPSS for Windows version 14 (SPSS Inc., Chicago IL, USA). Pearson's chi-square tests and Mann-Whitney-U-tests were used to determine statistically significant differences between groups, with a p-value (always two-sided) of less than 0.05 considered to be statistically significant. The choice for a statistical test to search for significant associations between different parameters was based on the nature of these parameters. The present study can therefore, and also because of its originality, be considered as exploratory.

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## Results

Seventy-two per cent of the distributed questionnaires (1158 out of a total of 1600) were returned. 151 returned questionnaires were not entered into the database as less than 50% of the questions had been answered ( $n = 15$ ) or specific questions of vaccination not answered ( $n = 136$ ). 1007 (63%) questionnaires were available for data analysis.

127 (12.6%) of all respondents declared that the paediatric patient presenting to the emergency department had not been vaccinated "as common in Switzerland", i.e. most likely did not get the basic vaccination recommended by the Federal Office of Public Health (FOPH) of Switzerland (diphtheria, tetanus, pertussis, polio, haemophilus influenza, measles, rubella and mumps) [10]. This corresponds to a vaccination rate among the respondents of 87.3%.

The socio-demographic characteristics of the children and of the families completing the questionnaires are depicted in table 1, in which the pa-

tients have been divided in two groups: vaccinated and non-vaccinated. Note that "non-vaccinated" means that the patients did not entirely follow the basic vaccination scheme. Whereas the non-vaccinated children were on average one year older than the vaccinated ones (6.6 versus 5.6 years,  $p = 0.015$ ), the age of the mothers of the non-vaccinated children (37.8 versus 35.5 years,  $p < 0.001$ ), as well as of the corresponding fathers (39.1 versus 37.5 years,  $p = 0.018$ ), were significantly higher than those of vaccinated ones. Whereas the group of the non-vaccinated comprised more girls than boys (52 versus 48%), the boys were more represented in the vaccinated group (57 versus 43%). An intact familiar structure was more often declared in the case of the vaccinated children than in that of the non-vaccinated ones by users (90 versus 83%,  $p = 0.038$ ), with single mothers being markedly more frequent in the case of the non-vaccinated children (15 versus 8%). No significant difference in the country of birth of the

**Table 1**

Socio-demographic characteristics, frequency of CAM use, and rates of recommended complementary vaccination and of additional vaccinations for persons at higher risk of the study respondents. The patients were divided into two groups: those that refused (at least some) basic vaccination and those that received all basic vaccinations. Data derive from information given by the respondents (see "Patients and Methods" section for the exact questionnaires text). The frequency of CAM-use and the rates of recommended complementary and other vaccinations in the two groups are depicted as well.

Respondents' characteristic		All		Refused (at least some) basic vaccinations		Received all basic vaccinations		Significance (p-value)
		n	%	n	%	n	%	
	Number (n)	1007		127	13%	880	87%	
Age (median and CI in years)	Child	5.8 (5.4–6.0)		6.6 (5.9–7.56)		5.6 (5.3–5.9)		0.015*
	Mother	35 (34.5–35.4)		37.8 (36.7–38.9)		34.5 (34–34.9)		<0.001*
	Father	37.6 (37.2–38.1)		39.1 (38–40.2)		37.5 (37–38)		0.018*
Age at birth of child (median in years)	Mother	29.18 (28.9–29.6)		31.0 (30.1–32)		28.9 (28.5–28.2)		<0.001*
	Father	31.87 (31.56–32.3)		32.4 (31.47–33.3)		31.8 (31.5–32.3)		0.323
Sex of the child (n, %)	Male	545	55%	60	48%	485	57%	0.039*
	Female	437	45%	66	52%	371	43%	
Family structure (n, %)	Living with both parents	876	89%	106	83%	770	90%	0.038*
	Living with mother	84	9%	19	15%	65	8%	
	Living with father	4	0%	1	1%	3	0%	
	Patchwork family	18	2%	1	1%	17	2%	
Country of birth (n, %) <i>Child</i>	Switzerland	75	44%	5	45%	70	44%	0.114
	Europe	40	23%	2	18%	38	24%	
	Other	55	32%	4	36%	51	32%	
Country of birth (n, %) <i>Mother</i>	Switzerland	340	50%	30	50%	310	50%	0.002*
	Europe	183	27%	19	32%	164	26%	
	Other	156	23%	11	18%	145	23%	
Country of birth (n, %) <i>Father</i>	Switzerland	354	50%	37	50%	317	50%	0.125
	Europe	205	29%	20	27%	185	29%	
	Other	149	21%	17	23%	132	21%	
Higher school education (n, %)	Mother	450	47%	65	54%	385	47%	0.139
	Father	535	57%	75	63%	460	57%	0.181
Household income (Euros per month and interquartile ranges)		4987 (4081)		4580 (1360)		5051 (4081)		0.05*
Insurance (n, %)	Basic insurance	803	80%	109	86%	694	79%	0.087
	Half private	99	10%	9	7%	90	10%	0.3412
	Private	73	7%	8	6%	65	7%	0.7959
	Additional insurance for CAM	530	54%	102	84%	428	50%	<0.001*
	CAM use	632	63%	115	90%	517	59%	<0.001*
Complementary and other vaccinations (n, %)	Flu	54	5%	3	2%	51	6%	0.163
	Tick-borne encephalitis	185	18%	17	13%	168	19%	0.152
	Invasive pneumococcal disease	82	8%	2	2%	80	9%	0.006*
	Invasive meningococcal disease	96	10%	5	4%	91	10%	<0.001*

\* p &lt;0.05

children could be found between the vaccinated and non-vaccinated groups. Whereas no statistically significant difference concerning the school education of the parents could be found between the two groups, the household income was higher in the groups of the vaccinated children (4580 versus 5051 Euros,  $p = 0.05$ ). The type of health insurance was identical in the two groups, but the prevalence of an additional insurance for CAM was markedly higher in the group of the non-vaccinated children (84 vs. 50%,  $p < 0.001$ ). Overall 63% of all respondents (6322 of 1007) reported that their child used some form of CAM therapy, 90% ( $n = 115$ ,  $p < 0.001$ ) in the group of the chil-

dren which were not vaccinated according to the basic schema. In this later group, the rates of the recommended complementary vaccinations were also lower.

The rate of vaccinations (basic, complementary and other) was compared between the groups of CAM-users and non-users (see table 2). It turned out, that the refusal of basic vaccination (see list above) was significantly higher in the group of the CAM-users that among the non-users (18.2% of the CAM users versus 3.5% of the non-users,  $p < 0.001$ ). Concerning the decision making process on the basic vaccination, the data showed that in 8.7% ( $n = 88$ ) of all respondents,

**Table 2**

Vaccination-related decisions of the study respondents. The patients were divided in two groups: CAM-users and non-users. Data derive from the information given by the respondents.

Respondents	All	CAM-users		Non-users		Significance (p-value)	
Number	1007	632	62.8%	375	37.2%		
Refused basic vaccinations which are recommended in Switzerland	128	12.7%	115	18.2%	13	3.5%	<0.001*
Physician recommended renouncing to certain basic vaccinations	40	3.9%	34	5.4%	6	1.6%	0.002*
Refuse certain basic vaccinations although the Doctor recommended them	88	8.7%	81	12.8%	7	1.8%	<0.001*
Complementary and other vaccinations							
Flu	61	6.0%	34	5.8%	27	7.1%	0.274
Tick-borne encephalitis	192	18.9%	134	21.2%	58	15.4%	0.025*
Invasive pneumococcal disease	85	8.4%	50	7.9%	35	9.2%	0.481
Invasive meningococcal disease	101	10.0%	68	10.8%	33	8.6%	0.331

\* p <0.05

**Table 3**

Physicians' attitude towards CAM and rate of vaccine-refusal by the corresponding patients. Data on the physicians' attitude are derived exclusively from information given by the respondents. The ratio between the number of respondents refusing some basic vaccines and of those using CAM is shown (%-value). The rate of parents' choice for vaccination refuse despite physicians' recommendation is shown as well (%-value).

Physicians attitude towards CAM	Respondent refused at least some basic Vaccines / Number of Respondents	Parental refuse of at least some basic Vaccines despite Physicians' Recommendation		
Physicians practising CAM	68 / 160	42.5%	32	47.0%
Homeopathy	34 / 79	43.0%	20	58.8%
Anthroposophic Medicine	22 / 42	52.4%	7	32.8%
Phytotherapy (Herbal Medicine)	7 / 11	63.6%	4	57.1%
Chinese medicine (TCM), Acupuncture	2 / 14	14.3%	0	0%
Other	3 / 14	21.4%	1	33.3%
Respondents never talked to doctor about CAM	29 / 455	6.4%	22	75.8%
Physician was against CAM-Therapies	5 / 38	13.2%	5	100%
Physician tolerates CAM and did not object	44 / 194	22.7%	39	88.6%

i.e. in 68.7% of the refusals, the parents had decided against a vaccination although the physician had recommended it. This means that the physicians themselves were responsible – in as much as they had recommended renouncing to certain vaccinations – for merely 31.3% of the refusals, i.e. in only 3.9% of all cases. Users and non-users of CAM showed comparable rates of immunisation in the case of the mentioned complementary vaccinations. The rates were as well comparable in the case of the vaccination against flu, which is only recommended for persons at higher risk. Small tendencies for higher rates of vaccinations against flu and pneumococcal disease could be detected among the non-users of CAM, whereas the rate of vaccination against meningococcal disease seemed to be elevated in the CAM-users group. Against our expectations, the rate for vaccination against tick-borne encephalitis – another vaccination recommended only for persons at higher risk – in the CAM-users group was markedly and in a statistically significant way higher than among the non-users (21.2 versus 15.4%, p = 0.025).

The respondents were also asked about the attitude of their physicians towards CAM and the answers were related to the rate and the reasons for vaccination refuse (table 3). The rate of vaccination-refusal was the highest among patients who consulted physicians practicing herbal medicine (63.6%), followed by those using anthroposophical medicine (52.4%) and homeopathy (43.0%). Parents' choice predominated in the groups of respondents whose physician is against CAM (100%), whose physician tolerates CAM, but does not object to its use (88.6%) and of the respondents that do not talk with their physician about CAM (75.8%). Parents' choice still predominated in the groups with a physician practicing homeopathy or phytotherapy. In opposition, physicians' recommendation to some of the basic vaccinations predominated in the group of respondents that consulted physicians practicing anthroposophic medicine or Chinese traditional medicine.

## Discussion

Our results show that a considerable proportion (13%) of the children presenting to the emergency department of a hospital in the German-speaking part of Switzerland were missing some of the basic vaccines, which corresponds to a vaccination coverage of 87%. Although this number derives from information given only by the parents (see below), it compares well to the Swiss national vaccination coverage level reported for 2005 [11], if one looks at the recommended vaccines which are more often subject of discussion, namely those against measles, mumps and rubella (84.9–86.2% for one dose [11]). In opposition, the national coverage level for the double doses of the same vaccines are lower (75–72.6%) and those for the vaccines against the remaining diseases are higher (95.4–87.3%) [11].

The reasons for the refusal of vaccination more often reflected a personal decision of the parents than a physician's recommendation. Although the respondents were not directly asked about the reasons for the refusal of vaccinations, the comparison of the socio-demographic characteristics of the group of children missing some vaccinations with those of the group of children with all basic vaccinations unveils some of the parents' options underlying that refusal (see below). Comparable data have been previously published, which showed that the decision for a Hepatitis B vaccination is influenced not only by the physician, but also by the patient's personal risk perception and mistrust in the medical establishment [12]. Moreover, the patients tend to become more aware of the side effects of a given vaccine as the incidence of the corresponding disease diminishes due to the vaccination's success [13]. For most people, the vaccination risks are perceived as being high, probably due to a few negative events happening in the last century and a deficient risk communication [14].

The socio-demographic characterisation of the group of children missing vaccination showed a higher proportion of girls, implying that parents might refrain from submitting girls – more than boys – to this voluntary medical intervention. The higher proportion of mother-only families among the group of children missing vaccines might reflect a particularly critical attitude of women towards vaccination. Since the household income of single-mother families is likely to be lower than in intact families, this might be associated with the decreased household income in the group missing some basic vaccines. A contradiction seems to exist between the relatively lower income in the group of the non-vaccinated children and the high prevalence of an additional insurance for CAM in the same group, which implies extra costs. This discrepancy might be related to the low costs of CAM in general, which translate in a moderate price for the additional insurance

(below 20 Euros per month). Whether this relatively low price of an additional insurance for CAM might be associated with the relatively high rate of CAM use in Switzerland will be the subject of further investigations.

Refusal of basic vaccination was significantly higher among CAM-users than among non-users. It is worth mentioning that the major reasons for the increased popularity of CAM are a strongly critical attitude to and distrust of conventional medicine as well as safety concerns [8, 15]. These reasons seem to overlap with the arguments for avoiding basic vaccinations. That the use of CAM often associates with low vaccination rates in children has been previously shown in a Canadian study on children presenting for naturopathic assessment [4]. However, the opinions of the CAM-physicians do vary [6, 7]. The majority of the Canadian naturopaths, for instance, would advise a partial vaccination [5]. Similarly, the German homeopathic physicians often make a clear distinction between the various vaccines, with the 'classical' vaccines against tetanus, diphtheria and poliomyelitis being preferred relatively to those against childhood diseases, as well as those directed to risk groups [16].

Approximately two thirds of all parents whose children did not receive the complete basic vaccination took this decision despite an opposite physician's recommendation. These data point in the same direction as our observations showing that most CAM-use can be attributed to self-medication [1]. A considerable part of the population seems to be reluctant to delegate decisions concerning medical issues to the physicians, with both the use of CAM and the decision to vaccinate or not being considered to be private issues. Occasionally, the parent's decisions might be surprising, as exemplified by a previous report on the coverage levels of vaccines against flu and invasive pneumococcal infections showing these to be higher among recent CAM-users in the USA than among non-users [17]. Our observation that CAM-patients opt for the vaccine against tick-borne encephalitis more frequently than non-users goes along the same line. It is conceivable that the CAM-users have a particularly high level of interest for health-questions, therefore looking not only for alternatives to conventional medicine but also for new products, such as new vaccines. An alternative explanation for the higher vaccination rate against tick-borne encephalitis might be that CAM-users may practise a lifestyle with more contact with nature and higher exposure to ticks, which would place them in a high risk group for tick-borne encephalitis.

The major limitations of the study are: the lack of clinical data, the exclusion of respondents who could not read or write German, English, French, and Italian, the lack of differentiation

among the different basic vaccines and a rather wide definition of CAM. The lack of clinical data implies that the description of the vaccination status of the patients was given exclusively by the respondents themselves while answering to the questionnaires, therefore an overestimation of the vaccination coverage can not be excluded. Also the data about their physicians were delivered by the respondents rather than by questioning the physicians directly. This has however the advantages of preserving the respondents and physicians anonymity and keeping the work load of the study and corresponding budget rather low. Furthermore the fact that the analysis was performed with only 63% of the distributed questionnaires can be seen as a limitation, since it can not be excluded that some sort of selection bias might have arisen at this stage. Since the filling-in of the questionnaires required a considerable amount of time, it is for instance conceivable that the respondents were either particularly interested in CAM, or had particularly strong feelings against CAM. Should the former case be true, the proportion of CAM-users might be overestimated, which however is unlikely in face of the association between CAM-use and vaccine refuse on the one hand, and of the similarity between the estimated vaccination coverage values and the national values on the other.

In summary, we could show that the lack of coping with the basic vaccination schema in our study-population, which is likely to represent the situation in the families of the German-speaking part of Switzerland, is associated with the use of

CAM. The refusal to follow the basic vaccination schema is mostly based on parents' choice and often occurs in opposition to the physician's recommendations. CAM-users, however, do use some other vaccinations at least as often as non-users, in the case of the vaccine against tick-borne encephalitis even more often. This observation seems to support the Swiss system of vaccine recommendations in as much as it provides the parents with freedom to choose and might shed some light on how to communicate the information about vaccinations to parents. Finally, our work indicates that the parents are making their decisions in a differentiated way and probably would like to be more involved in the decisions on medical issues affecting their children. It is important that the physicians in general are aware of this, so that they can provide these parents with accurate and detailed information about safety, side effects and benefits of vaccinations.

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