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# BMJ Open

## Clinical relevance of complementary medicine in orthopedic and trauma surgery: A survey on usage and needs

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## **Clinical relevance of complementary medicine in orthopedic and trauma surgery: A survey on usage and needs**

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## Abstract

**Objectives:** Complementary and alternative medicine (CAM) is frequently used in Western countries within general medicine and internal medicine. Information on the use in orthopedics and trauma surgery is widely lacking. The aim of this study was to investigate the clinical relevance of CAM for these patients.

**Design:** Prospective paper-based, pseudo-anonymous survey

**Setting:** From August to December 2018 a questionnaire, composed of 17 questions, was distributed to all eligible patients.

**Participants:** In-house patients in orthopedic and trauma surgery at a high-volume medical center in Germany

**Primary and secondary outcome measures:** Previous or current usage of CAM, interest and requests towards CAM as well as communication about CAM

**Results:** Overall, 457 orthopedic and trauma surgical patients took part in the survey. They were on average 52 years old and 54% were male. Most of the patients were admitted due to bone fractures and most underwent operative therapy. Previous or current CAM usage was stated by 76% and 30% of patients, respectively. Most of the patients stated to be interested in usage of CAM and demanded for more clinical usage of CAM and reliable information about CAM. More than 90% of patients did not discuss CAM interest or usage with their treating physicians. Patients stated that physicians should have knowledge about CAM. They wish to be treated in a holistic manner and want to strengthen self-efficacy.

**Conclusions:** Usage of CAM of patients in orthopedic and trauma surgery appears to be high. Only a few patients discuss their interest and usage of CAM with their treating physician. Therefore, surgeons should ask their patients about CAM and should consider evidence-based CAM approaches for complementary treatment.

**Trial registration:** German Clinical Trials Register (DRKS0001544)

(277 words)

Keywords: Acupuncture, herbal medicine, phytotherapy, surgery, Germany, questionnaire

### Summary: Strengths and limitations of this study

- In the absence of a validated questionnaire for orthopedic and trauma patients, a modified version of a previously used questionnaire was used.
- The high response rate of the survey strengthens the results.
- The survey might not be representative for the remaining parts of Germany and others countries as it was limited to one single area.

For peer review only

## Background

Complementary and alternative medicine (CAM) is a general term comprising a variety of diverse therapeutic approaches, which are not considered as a part of conventional medicine. Popular and commonly known examples are acupuncture as a part of the Traditional Chinese Medicine (TCM), phytotherapy, naturopathy and homeopathy as well as Anthroposophic Medicine. CAM is mostly used to complement conventional therapy and many CAM treatments contain elements to support self-efficacy of patients[1]. Many patients use CAM independently and without prior consultation of a physician[2,3]. Patients often consider CAM as safe, natural and devoid of harmful potential[4]. Patients' aims for usage of CAM are diverse: It is widely used in patients with non-life-threatening and self-limiting diseases such as respiratory and gastrointestinal infections[5]. But CAM is also popular in patients with chronic and life-limiting diseases like cancer[6]. Meanwhile, methods of CAM with proven evidence have found their way into various official treatment guidelines in Germany[7,8], some of them are also related to relief of pain[9,10]. In the field of orthopedic and trauma surgery CAM treatments have been found to be efficacious for example in chronic non-specific back pain and osteoarthritis of the knee[11,12]. However, less is known about the frequency of interest and usage of CAM in orthopedic and trauma surgical patients. Communication about CAM between attending physicians and patients appears to be poor; more than 80% of cancer patients from Switzerland were not asked about usage of CAM[4]. While it tells the physician about health related beliefs and preferences of the patient, which is important for good adherence and a patient-centered treatment, information about CAM use may also be a safety issue. Improper CAM usage means not only a financial burden for patients but also may cause inappropriate side effects and interactions with conventional medications, especially what herbal medicine is regarded[4,13]. This study aimed to evaluate the usage and demands regarding CAM in patients referred to a Department of orthopedics and trauma treatment.

## Methods

Between August and December 2018 a monocentric, paper-based, cross-sectional study among orthopedic and trauma patients at a German Medical Center was conducted. The study was approved by the local ethical committee (EK-BR-49/18-1) and was conducted according to the Declaration of Helsinki. Written consent was obtained for all participants. All patients of all ages and all diagnoses, who were admitted for inpatient treatment to the Department of Orthopedics, Trauma and Hand Surgery at the Medical Center, were consecutively screened for eligibility. Reasons for exclusion were cognitive impairment and inability to communicate (e. g. language barriers or due to physical condition). Out-patients and patients staying in intensive care unit were not considered. Patients received the questionnaire by a nurse during their admission procedure. Patients were asked to complete the questionnaire independently and on their own and return it to the nurse after finishing.

### *Questionnaire*

In the absence of a validated questionnaire for orthopedic and trauma patients, a modified version of a questionnaire was used, which was recently developed by the academic center for complementary and integrative medicine of the German state Baden Württemberg (AZKIM, [www.azkim.de](http://www.azkim.de)) for a CAM-survey among inpatients of 4 German University Hospitals[14]. The questionnaire contained 17 questions which are related to socio-demographic aspects (insurance, age and gender), diagnosis (reason for hospitalization) and planned therapy. In a next set of questions the knowledge and usage of different types of CAM is respected. Further questions are on reasons for usage and experience with currently used CAM as well as reasons for non-usage of CAM and about communication between patients and their attending physician about CAM usage. At the end all patients had to state what is subjectively of importance for their treatment and what they would desire during hospital stay. The questionnaire is only available in German.

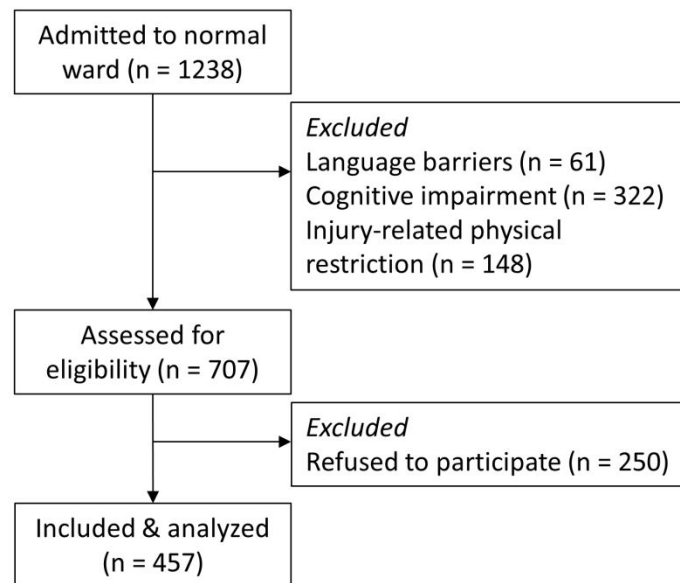
### *Statistics*

Population size and an error probability of 5% for a 95% confidence interval led to a calculated sample size of 384 patients. Since it was expected that a substantial number of admitted patients would not willing to consent to the study, number of cases was adjusted to 960 persons covering a non-participation rate of 60%. Questionnaires were numbered in sequence. Data were transferred in a pre-formed table (Microsoft Excel) by two authors. The database was closed before analysis of the data. Analysis was performed using IBM SPSS (Version 25.0). Descriptive analysis was performed for the whole cohort including all patients. Results are expressed as absolute values and percentage of patients, who answered the question. For analyzing influencing factors and subgroup comparison linear regression as well as Chi-squared test or, in case of small sample numbers, Fisher's exact tests were used.  $P < 0.05$  was considered as significant.

### **Results**

A total of 457 out of 1238 admitted patients (37%) could be included into the study, answered the questionnaire and were analyzed (see figure 1). Reasons for exclusion were cognitive impairment ( $n = 322$ ), injury-related physical restriction ( $n = 148$ ) and language barriers ( $n = 61$ ). 250 patients refused to participate. Socio-demographic aspects of included patients are shown in table 1. 247 (54%) were male and 196 (43%) were female. Fourteen patients (3%) did not state their gender. Patients were on average 52 (range 17-93) years old. Only 9% ( $n = 39$ , always percentage of patients, who answered the question) of the patients had a private health insurance. Occurrence of bone fracture ( $n = 165$ , 37%) was the most common reason for hospital admission. More than 70% of the patients ( $n = 317$ , 72%) underwent operative therapy during their hospital stay.





25 **Figure 1:** Process of screening, including and analysis of participants

28 **Table 1:** Health insurance status, reason for admission and planned therapy of study participants

29 \*Main reasons were removal of metal plates and other implants after surgery as well as inflammation of joints  
30 and tendon and shoulder injury

31 (Results are expressed as absolute values and percentage of patients, who answered the question)

32 (n, %)

<b>Gender</b>	
male	247 (54%)
female	196 (43%)
not stated	14 (3%)
<b>Status of health insurance</b>	
statutory	400 (91%)
private	30 (7%)
supplementary	9 (2%)
<b>Reason for admission</b>	
Chronic back pain	3 (1%)
Acute back pain	15 (3%)
Bone fracture	165 (37%)
Ligament injury	29 (6%)
Cancer	3 (1%)
Endoscopic examination of a joint	10 (2%)
Joint replacement	16 (4%)
Concussion	16 (4%)
Accident	127 (28%)
Other*	65 (14%)
<b>Planned therapy</b>	
Operation	317 (72%)
Not operative	56 (13%)
I don't know	64 (15%)

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### *Popularity of CAM (figure 2 and 3)*

The most known therapy was acupuncture (n = 353, 81%), followed by motion therapy (n = 336, 79%), dietary supplements (n = 313, 75%) and yoga (n = 307, 73%). Least known were craniosacral therapy (n = 31, 8%), TCM (n = 120, 29%), probiotics (n = 146, 36%) and acupressure (n = 154, 38%). Patients were most interested in learning about TCM (n = 93, 23%). Patients added sporadically further approaches such as reflexology, hiking, fascial treatment, kinesiology, cupping, neural therapy and Feldenkrais.

All in all 76% of patients (n = 347) have been currently or in the past been using one or several of the listed CAM therapies, 30% (n = 139) were currently using CAM (figure 3). Most commonly used therapies were motion therapy (n = 203, 44%), followed by manual therapy (n = 161, 35%) and dietary supplements (n = 140, 31%). Only a few patients used craniosacral therapy (n = 18, 4%), TCM (n = 30, 7%) and acupressure (n = 32, 7%).

### *Patients' requests (figure 4 and 5)*

Almost 80% of patients stated that physicians should have knowledge about CAM (n = 282, 77%). CAM consultation (n = 281, 76%) as well as more information about self-efficacy (n = 330, 86%) was desired by most of the patients during their hospital stay. Treatment in holistic manner would be desirable for more than 80% of the patients (n = 312, 83%), and almost 90% stated that they want to make their own decision about therapy (n = 318, 87%). Also the patients desired that CAM should be covered by their health insurances. Hospitalized patients wish for more usage of CAM therapies as popularity of all in figure 5 shown mentioned approaches was more than 65%. Most popular were pain therapy (n = 292, 86%) and motion therapy (n = 305, 87%).

University CAM research is supported by more than 70% (n = 261, 73%). More than 80% of patients (n = 298, 83%) wish for reliable information about CAM.

### *Patients with previously and currently usage of CAM (figure 6)*

Comparison of socio-demographic aspects of patients with (n = 163) and without (n = 294) currently usage of CAM is shown in table 2. There was a higher percentage of females in the group with CAM usage (49 vs. 40%, p = 0.046). Other socio-demographic aspects were not different between the groups. Reasons for usage of CAM were body strengthening and health preservation (n = 123, 91%) and body support (n = 123, 89%). Only 23 (21%) patients stated that they used CAM because conventional therapy was ineffective and 42 (35%) patients reported to use CAM exclusively. CAM is perceived as a gentle therapeutic approach by more than half of the patients (n = 73, 63%), and more than 90% of patients (n = 112) rated CAM therapies as harmless. The most common reasons for termination of CAM usage were no further need of CAM in 78 patients (79%), followed by no or small effectiveness in 16 patients (39%) and too expensive therapy costs in 26 patients (37%). Side-effects occurred in 16 (13%) patients, but only 9 of them terminated CAM usage. More than 90% of

patients (n = 119) would recommend CAM usage and almost 90% were satisfied with it (n = 113, 89%). Most of the patients stated recommendation for CAM usage was given by family doctors, other non-surgical attending physicians, physiotherapists or nurses (n = 55, 42%), followed by recommendation of family and friends (n = 36, 27%). Media such as journals, internet or social media were used by 23 patients (18%). Alternative practitioners were only consulted by 9 patients (7%). Less than 30% of patients with currently CAM usage stated that they told their attending physician about CAM interest (n = 28) and CAM usage (n = 27). Reasons for not-speaking of these patients were the feeling that there was no time for talking about it (n = 58, 56%) or an expectation of physicians' negative attitude towards CAM usage (n = 21, 23%) or that physician was the wrong contact regarding CAM (n = 16, 17%). Only 12 patients (17%) stated an expected incompetence of the physician.

**Table 2: Subgroup analysis: Socio-demographic differences of patients with and without currently usage of CAM**

(CAM = complementary and alternative medicine; Results are expressed as absolute values and percentage of patients, who answered the question)

	<b>With CAM (n = 163)</b>	<b>Without CAM (n = 294)</b>	<b>P</b>
Sex (n male/female, %)	81/78 (51/49%)	151/101 (60/40%)	<b>0.046</b>
Age (years, range)	52 (17-92)	52 (17-93)	0.954
<b>Insurance (n, %)</b>			
statutory	146 (92%)	228 (92%)	0.806
private	10 (6%)	18 (7%)	
supplementary	3 (2%)	3 (1%)	
<b>Reason of admission (n, %)</b>			
Chronic back pain	2 (1%)	0 (0%)	0.707
Acute back pain	5 (3%)	6 (2%)	
Bone fracture	65 (40%)	90 (35%)	
Ligament injury	9 (6%)	18 (7%)	
Cancer	1 (1%)	2 (1%)	
Endoscopic examination of a joint	4 (3%)	6 (2%)	
Joint replacement	7 (4%)	7 (3%)	
Concussion	6 (4%)	10 (4%)	
Accident	41 (25%)	76 (30%)	
Other	21 (13%)	40 (16%)	
<b>Planned therapy</b>			
Operation	110 (70%)	186 (75%)	0.214
Not operative	19 (12%)	34 (14%)	
I don't know	28 (18%)	29 (11%)	

Of all patients with CAM experience only 15% (n = 42) reported usage of CAM to their attending physician. Reasons were the feeling that there was no time for talking about it (n = 120, 49%) or an expectation of physicians' negative attitude towards CAM usage (n = 35, 16%) or that physician was the wrong contact regarding CAM (n = 65, 30%). Only 10% (n = 22) stated an expected incompetence of the physician. Patients added further reasons for not-speaking about CAM interest and usage: No currently need for CAM usage (n = 25), no knowledge of CAM possibility (n = 23) and no interest regarding CAM (n = 5). Overall, only 12% (n = 44) of all patients, who answered questions about

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3 interest and usage of CAM (including also patients without knowledge of CAM experience), reported  
4 that they told their attending physician about CAM interest and only 12% (n = 45) told their physician  
5 about usage of CAM.  
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### 8 9 *Reasons for non-usage of CAM*

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11 260 patients (41%) stated currently non-usage of CAM. Reported reasons were no necessity for CAM  
12 (n = 175, 67%), not-knowing of CAM possibility (n = 103, 40%), doubt about efficacy (n = 63, 24%)  
13 as well as too high costs of CAM (n = 63, 24%) and no current interest in CAM usage (n = 50, 19%).  
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15 31 patients (12%) stated to be afraid of side-effects. Patients added further reasons: Lack of CAM  
16 offering (n = 7) and not the right time for CAM usage (n = 4).  
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### 19 20 *Influence of gender, age and health insurance status*

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22 Linear regression analysis showed no significant influence of age, gender and health insurance status  
23 on general CAM usage. The elderly (> 65 years) had slightly less CAM usage compared to younger  
24 patients (36 vs. 39%), and all queried approaches of CAM were less known in the elderly. Large  
25 differences of knowledge were found in meditation (30 vs. 66%), chiropractic (23 vs. 49%), Yoga (51  
26 vs. 79%) and Pilates (29 vs 61%). Interest in getting more familiar with CAM was slightly higher in  
27 the elderly (mean of all approaches: 13 vs. 11%). Discussion of interest and usage of CAM with  
28 physicians was more common in the population aged 65 years and older than in younger patients.  
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30 Most CAM approaches were quite equally known by both sexes. Relaxation therapy was slightly more  
31 known in female than in male patients (67 vs. 53%). Interest in getting more familiar with different  
32 CAM approaches was similar in both sexes, but females wished also for more usage of CAM during  
33 hospital stays. Women used more frequently homeopathy (29 vs. 17%), relaxations techniques (30 vs.  
34 20%), manual therapy (42 vs 30%), Yoga (27 vs 10%) and dietary supplements (36 vs. 26%) than  
35 men. Consultations about CAM (52 vs. 35%) and self-efficacy (70 vs. 58%) as well as a holistic  
36 treatment (72 vs 61%) were more frequently favored by women. More female than male patients  
37 wished for more authority regarding their therapeutic decisions (72 vs. 58%).  
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## 49 50 **Discussion**

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52 CAM is widely used in the German population, especially in patients with chronic diseases such as  
53 cancer, but the results of our study show clearly that there is an interest for CAM also in surgical  
54 patients not admitted with cancer. To our knowledge this is the first study investigating the demand  
55 and usage of CAM in orthopedic and trauma patients in Germany. Surveys in surgical patients are  
56 rare: A Canadian survey investigated the usage of CAM in hepatobiliary surgical patients and found  
57 an overall usage rate of 27% summarizing a rate of 21% in non-cancer patients and of 34% in cancer  
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3 patients[15]. The most commonly used CAM approaches were herbal medications and supplements.  
4 Soós et al. examined the frequency of CAM usage of patients underwent surgery at the Department of  
5 Surgery of the Semmelweis University, Hungary [16]. The overall experience rate was 27%, whereof  
6 higher rates were observed in cancer patients. The most commonly used CAM approaches were TCM  
7 and motion therapies. Almost 70% of patients had an interest to learn more about CAM. An American  
8 survey showed that almost 60% of surgical patients had CAM experience, mostly as self-prayer,  
9 chiropractic treatment or relaxation therapy[17]. The currently usage rate was 25% and most patients  
10 stated to use CAM due to fewer side-effects or as a recommendation of a friend or a doctor. Other  
11 surveys in non-surgical patients show, like ours, that patients often use CAM by themselves and  
12 without prior consultation of their attending physicians but desire that their physicians know about  
13 CAM[2,3,18]. Communication on CAM was poor not only in our study. Most studies reported only  
14 one third of patients informing their attending physician about usage of CAM[2,19–21]. Soós et al.  
15 found an even lower rate of 20% in surgical patients[16]. In our study just a few patients told their  
16 attending surgeons about CAM, often because they thought that there is no time for it. Whether this is  
17 a safety risk or not can to the present knowledge only be speculated, because reliable data on the risk  
18 of non-communicated CAM are lacking. At least for herbal preparations, which in rare cases can cause  
19 interactions with conventional medicine or can interfere with coagulation[13,22,23], a more open  
20 communication would be desirable. The lack of communication might also explain the gap between  
21 interest and usage of CAM. Interest in CAM was clearly bigger than usage of CAM in our study.  
22 Patients without usage of CAM reported in 40% that they were not aware of CAM options. Similar  
23 observations were also made by others emphasizing the importance of reliable CAM information for  
24 patients[16,19]. Wang et al. also reported that patients who were not willing to incorporate CAM  
25 might be changing their mind, if a physician would provide them reliable information about CAM[17].  
26 Some patients who stated no necessity of CAM added “not now” indicating that the acuteness of their  
27 disease leaves no space for additional therapies. Surgical treatment is often necessary due to acute  
28 diseases leaving no time and no possibilities for usage of CAM and patients with an acute trauma are  
29 often otherwise healthy. Schieman et al. reported that one of the most common causes for CAM usage  
30 in surgical patients was boosting of energy[15]. Bauer et al. found that more than 80% of cancer  
31 patients from a self-help group were interested in CAM in order to strengthen body’s own healing-  
32 forces[19]. This is in accordance with our results, as CAM users mostly stated that they do it to  
33 strengthen their healing capacity and resistance. As mentioned above, in other studies and also in our  
34 study patients use CAM to avoid side-effects[17,21]. Whether this is applicable and whether the  
35 risk/benefit ratio is better for CAM than for conventional medicine cannot in depth be answered within  
36 this work. At least for high dosed phytotherapeutics it is clear that they have to be handled with the  
37 same care and respect than conventional medicine[20,24,25]. Patients using CAM reported that CAM  
38 was recommended by their attending physician or other medical staff such as physiotherapist. Other  
39 studies indicate that the strongest influence on patients regarding usage of CAM was given by family  
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3 and friends as well as attending physicians[17,18]. Almost 80% of our patients stated that physicians  
4 should have CAM knowledge. Reliable information about CAM and research for CAM were also  
5 demanded. Additional, the demand of patients to be more included in the decision-making process of  
6 therapy appears to be very high, as in our cohort more than 90% claimed to have authority. As the  
7 percentage of CAM users among orthopedic and trauma patient is substantial and the need for  
8 information about CAM is high it would, from a patient centered perspective, be desirable if also  
9 surgeons and specialists in orthopedics are informed about CAM options in their field or at least can  
10 refer patients to physicians who are qualified in CAM.  
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16 The preferred CAM methods appear to vary according to different indications. Our patients with  
17 orthopedic diseases favored motion and manual therapies and patients with cancer often prefer herbal  
18 medications and relaxation therapies[15,18,19]. Different to the results of others, chiropractic played  
19 only a minor role. Especially studies from Northern America indicate higher usage rates of  
20 chiropractic[15,17]. The frequency of CAM usage might also be affected by patients' health insurance  
21 status[4]. Private and statutory health insurances are covering different costs of CAM. Our study  
22 shows a slightly lower rate of private health insurance (7%) compared to overall private health  
23 insurance rate in Germany (7 vs. 12% as reported in 2017)[26]. Health insurance status in Germany  
24 depends on patients' income and the trial hospital is located in an area with a lower than average  
25 income[27]. Therefore, the difference might be attributable to the income of the patients. The bigger  
26 interest of women in CAM has been reported in many publications and could be confirmed by our  
27 results[2,16,18,19] but the difference was only small. In summary, our study was able to show the  
28 general interest of surgical patients regarding CAM and it emphasizes the importance of physicians'  
29 knowledge of CAM nowadays.  
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#### 39 *Strengths and limitations:*

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42 The survey might not be representative for Germany as it was limited to one single location. It did not  
43 ask for further, potentially influencing socio-demographic differences such as educational status and  
44 nationality. Response rate (65%) of our survey was higher than expected as others reached response  
45 rates lower than 30%[16,19,28].  
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#### 49 **Conclusion**

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52 Usage of CAM appears to be less common in surgical patients compared to usage frequency of  
53 patients in other disciplines, which might be attributable to the often occurring acuteness of surgical  
54 diseases. Nevertheless, most surgical patients stated to be interested in usage of CAM and would  
55 appreciate a higher frequency of clinical CAM usage. Only a few patients discuss their interest and  
56 usage of CAM with their attending physician leading. Therefore, surgeons should ask their patients  
57 about CAM.  
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## Abbreviations:

CAM: complementary and alternative medicine, TCM: Traditional Chinese Medicine

**Total word count:** 3560 words

## Declaration section:

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**Competing interests:** None of the authors had a competing interest.

**Data statement section:** Data is available on reasonable request to all interested researchers.

**Acknowledgement:** None.

### Author statement:

AK, RH and AKL are responsible for conception and design. Raw data was acquired by AK, NR and LS. Data was analyzed by AM and AKL. Statistical analysis was performed by AM and AKL. AKL wrote the manuscript with help of AK. LS and RH revised the article.

**Patient and public involvement:** Patients or the public were not involved in the design, or conduct, or reporting, or dissemination plans of our research.

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### 34 **Figure legends**

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36 Figure 1: Process of screening, including and analysis of participants  
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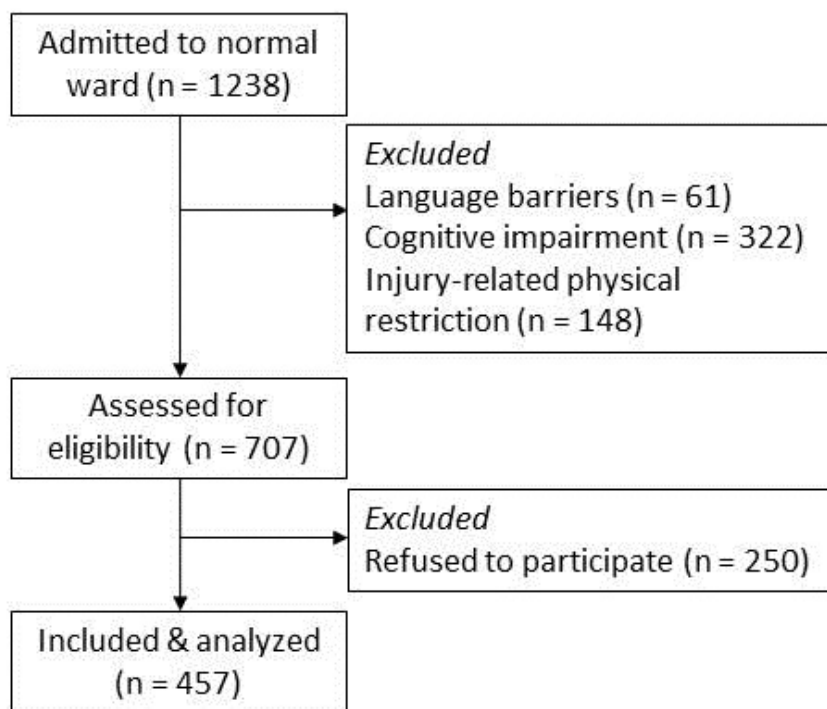
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40 Figure 2: Popularity of CAM and interest in getting more knowledge about CAM  
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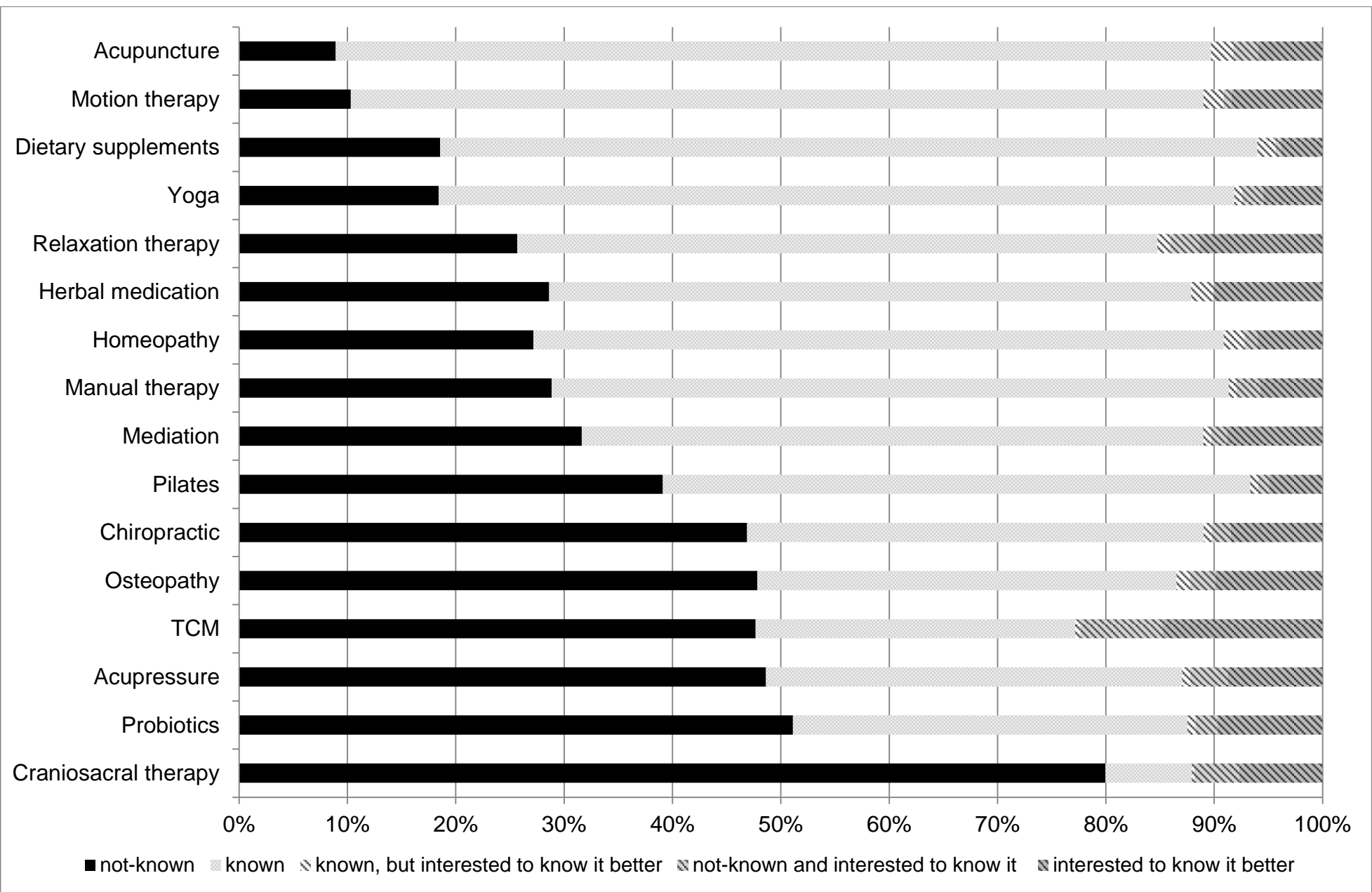
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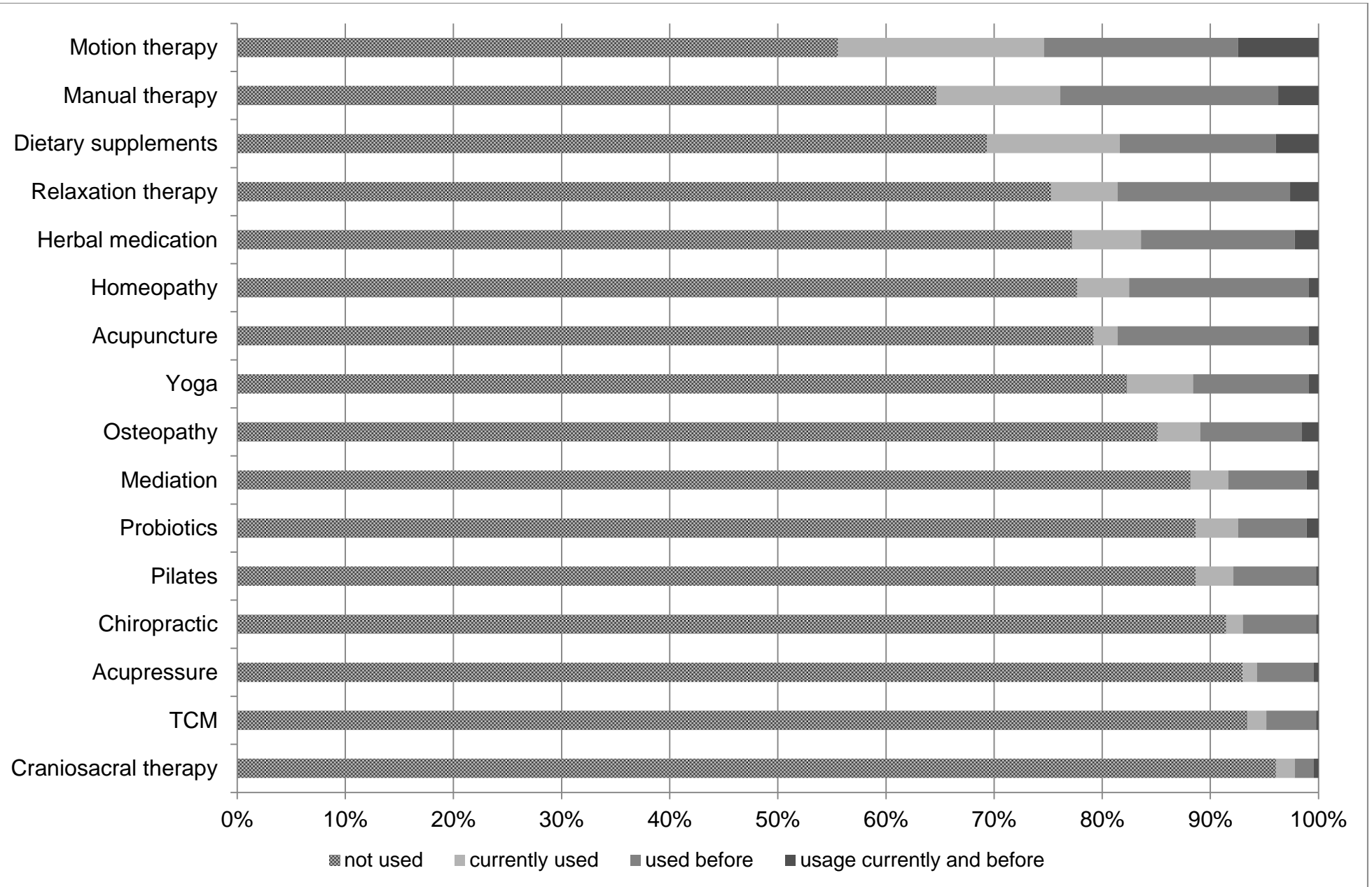


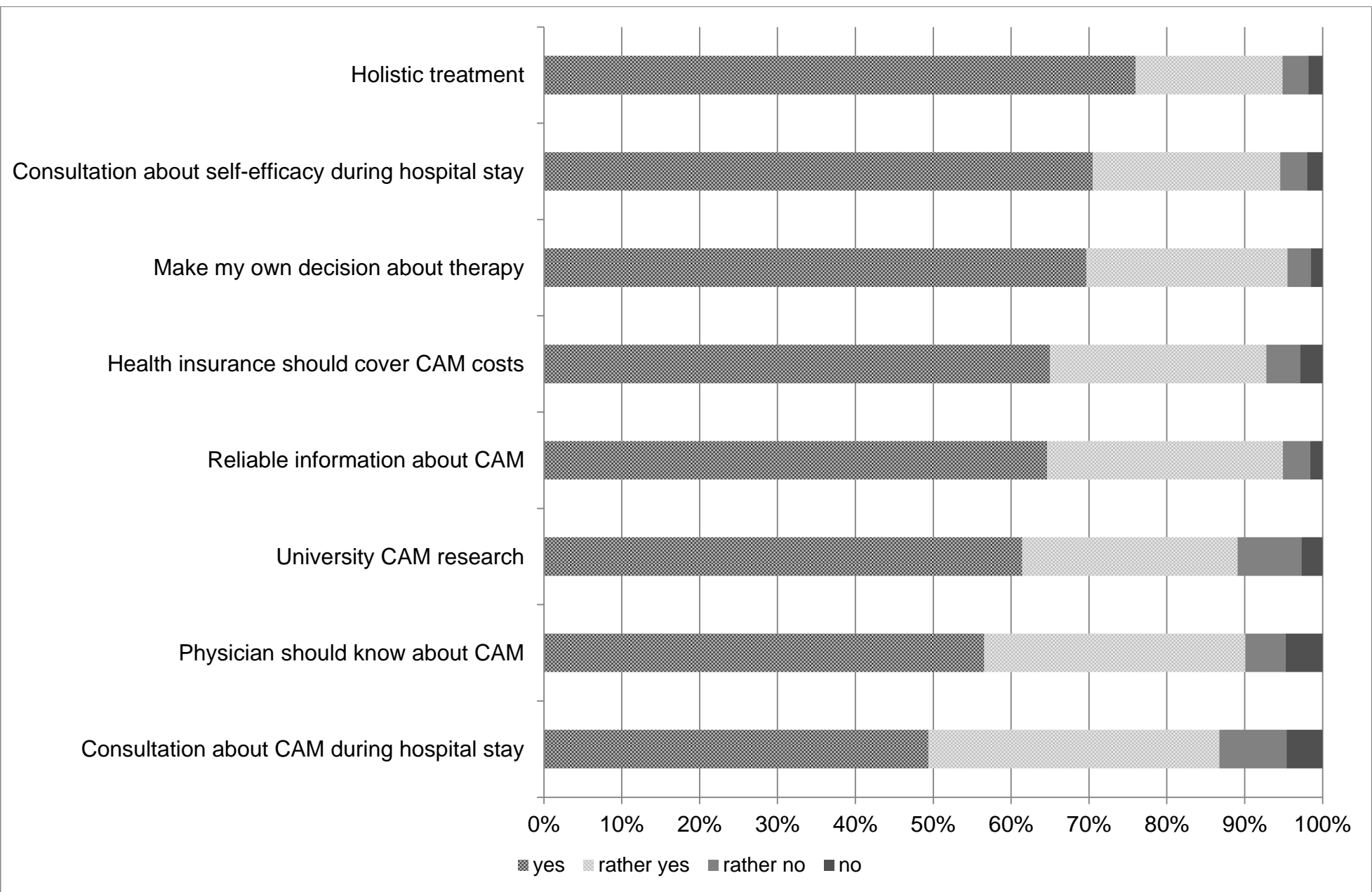
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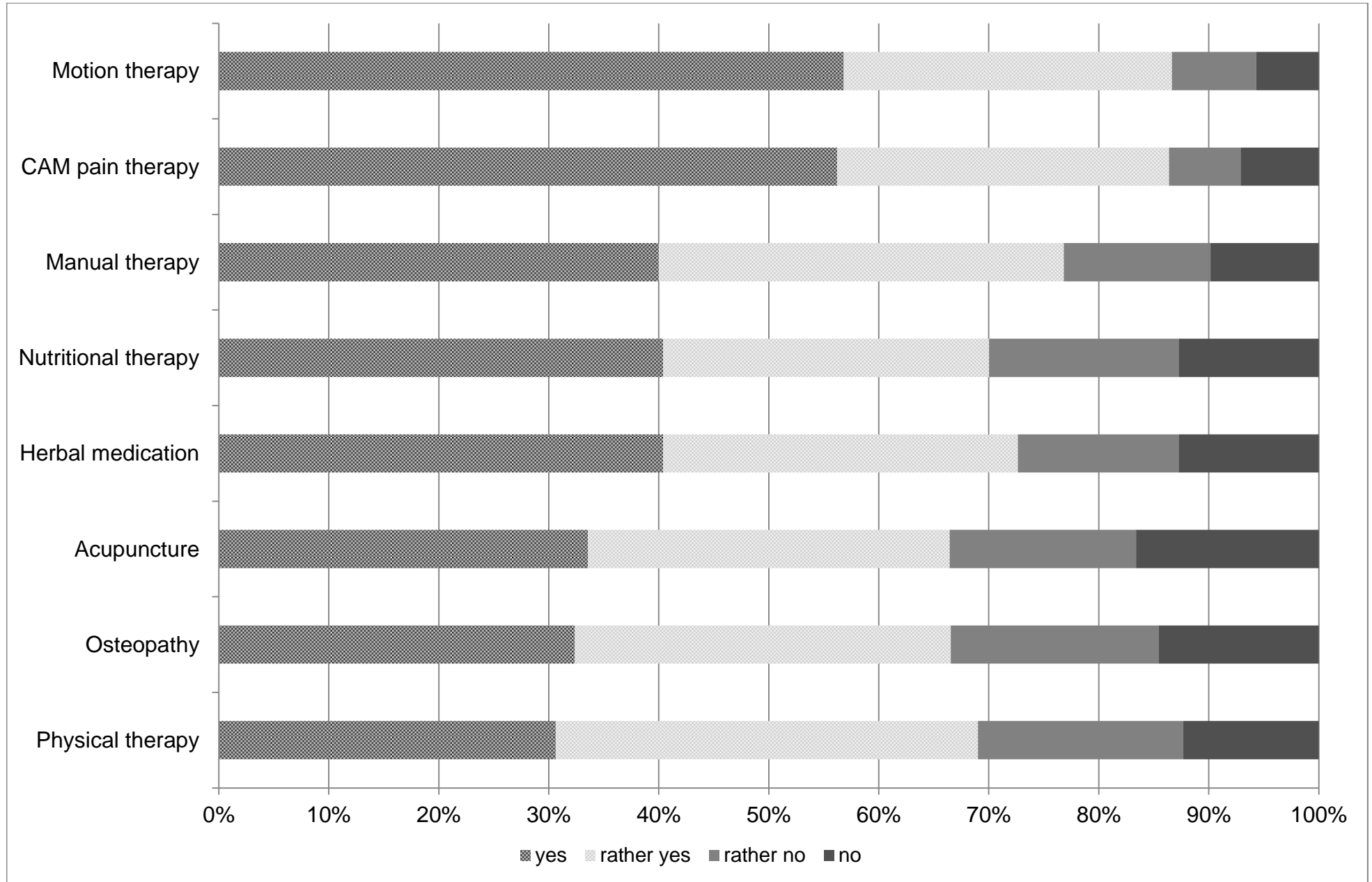
Figure 1: Process of screening, including and analysis of participants

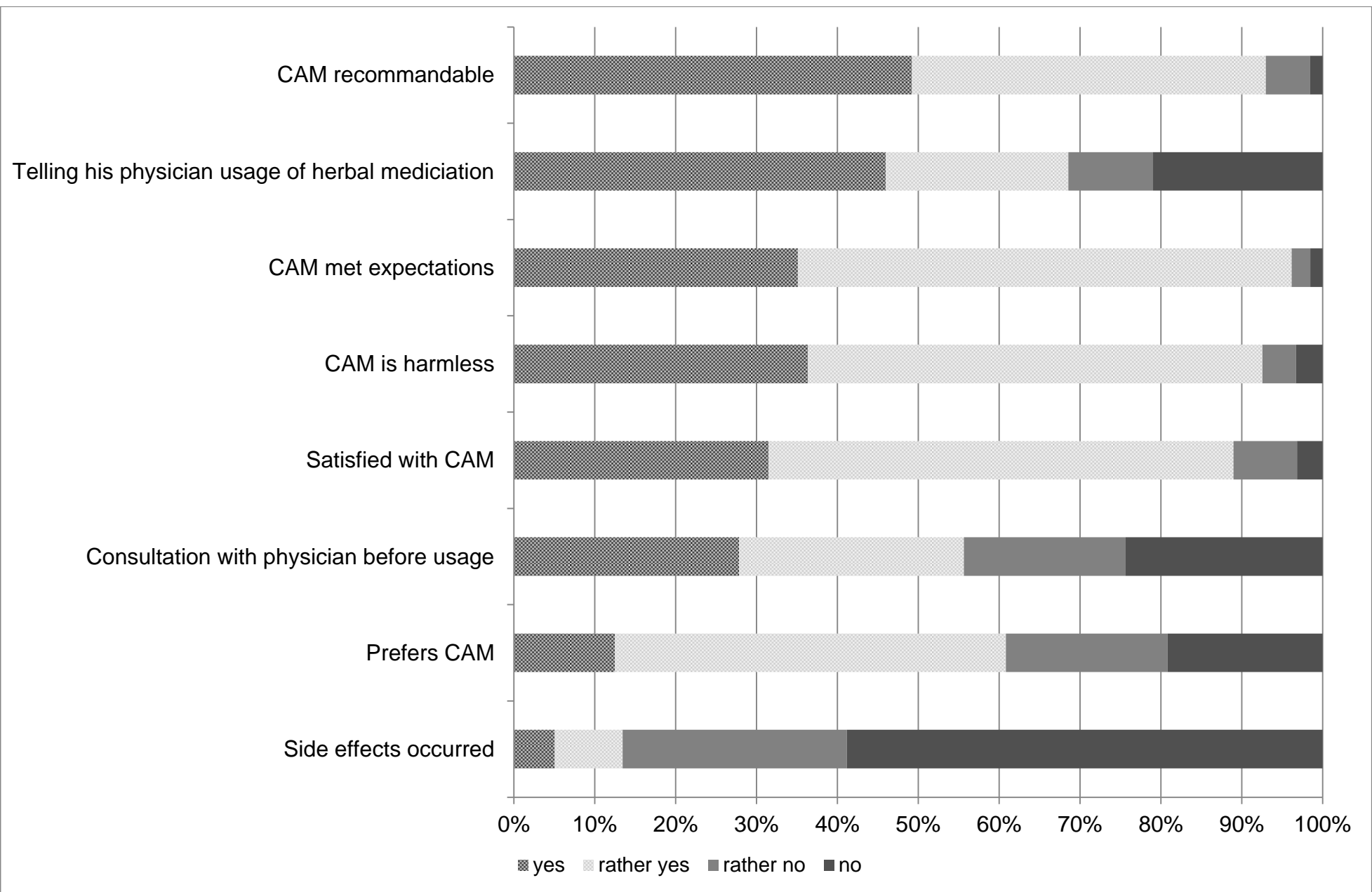
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# Prüfplan

## **Einstellung und Beratungsbedarf bezüglich Komplementärmedizin bei Patienten orthopädisch/ unfallchirurgischer Stationen - eine Befragungsstudie des Klinikum Chemnitz**

### Prüfplan vom 30.05.2018

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Finanzierung	Eigenmittel



# Zusammenfassung

## Hintergrund

Die Komplementärmedizin (KM) scheint nicht nur in unserer Bevölkerung ein zunehmendes Interesse zu wecken, sondern hat auch Eingang in chirurgische und andere medizinische Leitlinien gefunden. Für die orthopädisch/ unfallchirurgische Abteilung sind hier für die konservative Therapie vor allem die Diagnosen Gonarthrose und Nicht-Spezifischer Kreuzschmerz zu nennen [2], [3], [4]. Andererseits kann die Einnahme von Phytopharmaka auch zu unterschiedlichen Aus- und Nebenwirkungen für den operativen Eingriff führen. Angefangen von Narkosezwischenfällen bis hin zu postoperativen Blutungen und Wundheilungsstörungen können verschiedene Komplikationen auftreten. Insbesondere für elektive Eingriffe scheint es wichtig zu sein, die Einnahme von Phytopharmaka in der Anamnese zu berücksichtigen, um die Narkose- und Operationsplanung entsprechend abstimmen zu können [1].

Angelehnt an eine Studie des Uni-Zentrums Naturheilkunde, welches in Kooperation mit dem Akademischen Zentrum für Komplementäre und Integrative Medizin (AZKIM) Patienten verschiedener Fachdisziplinen in baden-württembergische Universitätsklinika befragt hat, sollen nun in der orthopädisch/ unfallchirurgischen Abteilung im Klinikum Chemnitz der Bedarf sowie die Einstellung zur Komplementärmedizin erfragt und überprüft werden.

## Fragestellungen

Primär: Erhebung der Einstellung und des subjektiven Bedarfs bezüglich KM von Patienten der orthopädisch/ unfallchirurgischen Abteilung.

Sekundär: Vergleich der Ergebnisse der AZKIM-Befragung, die mit ähnlichen Fragebogen gearbeitet hat, mit anderen Standorten und Fachdisziplinen

## Studiendesign

Monozentrische, pseudonymisierte Befragungsstudie, papierbasiert

## Studienteilnehmer

In die Studie eingeschlossen werden volljährige, geschäftsfähige Patienten, welche im Zeitraum von 01.07.2018 bis 30.09.2018 auf der orthopädischen/ unfallchirurgischen Station behandelt werden.

## Studienablauf

Konsequente Befragung aller Patienten, welche in der orthopädisch/ unfallchirurgischen Abteilung behandelt werden, mittels Fragebögen.

Version 1 postAKL vom 08.05.2018

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# 1 Hintergrund

Die Komplementärmedizin (KM) wird in der heutigen Gesellschaft zunehmend geschätzt und nicht nur als ergänzendes Therapieverfahren eingesetzt sondern auch als Alternative angewendet. So nehmen sogar bis zu 80% der Patienten vor einem chirurgischen Eingriff Phytopharmaka ein [1]. Mit dem Wissen, dass diese Präparate zum Einen unterschiedliche Nebenwirkungen und Interaktionen mit anderen Medikamenten, z.B. Narkosemedikamente, aufweisen und zum Anderen zu postoperativen Komplikationen, wie Wundheilungsstörungen und Blutungen führen können, sollte die Einnahme von Phytopharmaka Bestandteil der Anamnese sein [1].

Obwohl die KM bereits Eingang in die Leitlinien z.B. zur Gonarthrose und Nicht-Spezifischer Rückenschmerz gefunden hat und Patienten mit diesen Diagnosen auch immer wieder Teil des stationären orthopädisch/ unfallchirurgischen Patientenguts darstellen, ist die KM im Rahmen der stationären Behandlung kaum zu finden.

Um den aktuellen Bedarf und die Einstellung bei Patienten mit orthopädischer/ unfallchirurgischer Diagnose im Klinikum Chemnitz zu ermitteln, soll eine Befragung zur KM durchgeführt werden.

Darüber hinaus soll untersucht werden, inwieweit sich der Bedarf bei den stationären Patienten mit unterschiedlichen Erkrankungen unterscheidet. Im letzten Schritt sollen dann exploratorisch die erhobenen Ergebnisse im Hinblick auf Unterschiede zwischen den Fachdisziplinen, zwischen einem Maximalversorger und einem Universitätsklinikum sowie zwischen Ost- und Westdeutschland mit den Ergebnissen aus Baden-Württemberg verglichen werden.

## 2 Ziele der Studie

### 2.1 Fragestellungen

2. Primär: Erhebung der Einstellung und des subjektiven Bedarfs bezüglich KM von Patienten der orthopädisch/ unfallchirurgischen Abteilung.
3. Sekundär: Vergleich der Ergebnisse der AZKIM-Befragung, die mit ähnlichen Fragebogen gearbeitet hat, mit anderen Standorten und Fachdisziplinen mit ähnlichen Fragebögen (AKZIM).

## 3 Methodik

### 3.1 Studiendesign

Es wird eine monozentrische, anonymisierte Befragungsstudie durchgeführt.

### 3.2 Studienteilnehmer

In die Studie eingeschlossen werden volljährige, geschäftsfähige Patientin, welche in der orthopädisch/ unfallchirurgischen Abteilung des Klinikum Chemnitz stationär behandelt werden.

### 3.3 Einschlusskriterien

#### Patienten:

- Volljährige Patienten ( $\geq 18$  Jahre)
  - Geschäftsfähige Patienten
  - Aufnahme auf Normalstation der orthopädisch/ unfallchirurgischen Abteilung
- Einschluss unabhängig von Erkrankung und geplanter Behandlung bzw. Behandlungsdauer, Geschlecht und Herkunft sowie Behandlungsdringlichkeit (Notfall/elektiv).

### 3.4 Ausschlusskriterien

#### Patienten:

- Kognitive Beeinträchtigungen
- Erkrankungen, die die Geschäftsfähigkeit beeinträchtigen (z.B. Demenz, psychische Erkrankungen)
- Mangelnde Deutsch-Kenntnisse
- Sonstige mangelnde kognitive Fähigkeiten
- Ablehnung durch den Patienten

- 1 - Vigilanzminderung nach Unfall
- 2
- 3 - Patienten auf Intensivstation
- 4
- 5 - Ambulante Patienten
- 6

### 7 **3.5 Erhebungsinstrumente**

9 Für die Patientenbefragung werden mit der stationären Aufnahme Fragebögen  
10 ausgehändigt, welche der Patient selbstständig ausfüllen soll.

## 13 **4 Statistik**

### 17 **4.1 Zeitrahmen und Ort der Studie**

19 Die Studiendauer soll aus Gründen der Machbarkeit insgesamt 2 Monate betragen.  
20 Vorgesehen für einen Einschluss sind alle Patienten, welche in der Abteilung  
21 Orthopädie/ Unfallchirurgie im Klinikum Chemnitz behandelt werden, die die  
22 Einschlusskriterien erfüllen und bei denen kein Ausschlusskriterium vorhanden ist.  
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## 29 **5**

### 31 **5.1 Statistik und Anzahl der erwarteten Patienten**

33 Unter Beachtung der Ein- und Ausschlusskriterien werden ca. 700 Patienten für die  
34 geplante Studie in den vorgesehenen Zeitraum von 2 Monaten geschätzt.  
35 Die Daten werden papierbasiert erhoben und anschließend durch die Studienleitung  
36 pseudonymisiert in eine vorgefertigte Microsoft Excel-Tabelle eingegeben. Die  
37 Auswertung der erhobenen Daten erfolgt gemeinsam mit dem Kooperationspartner mit  
38 dem Statistikprogramm IBM- SPSS.  
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### 48 **5.2 Erfassung der Zielgrößen**

49 Die Datensammlung erfolgt prospektiv.  
50 Alle Patienten mit entsprechenden Einschlusskriterien erhalten einen Fragebogen,  
51 welchen sie selbst ausfüllen.  
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## 6 Besondere Risiken

Für die Patienten sind keine Risiken zu erwarten. Die vorgesehene Diagnostik und Therapie sind unabhängig von der Studie.

## 7 Datenschutz

Die im Rahmen dieser Studie erhobenen Daten werden vertraulich behandelt und verschlüsselt. Sie werden mit einer Identifizierungsnummer versehen, so dass Name und weitere personenbezogene Daten ausschließlich für die Studienleitung ersichtlich sind. Es gilt die ärztliche Schweigepflicht entsprechend dem Datenschutz. Der Kooperationspartner wird ausschließlich pseudonymisierte Daten der Teilnehmer erhalten.

Bei Veröffentlichung der Ergebnisse in einer wissenschaftlichen Zeitschrift oder auf einer wissenschaftlichen Tagung wird kein Rückschluss auf die Identität der eingeschlossenen Patienten möglich sein.

Jeder Patient erhält eine Einverständniserklärung und kann zu jederzeit sein Einverständnis zur Studie zurücknehmen.

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# BMJ Open

## Complementary medicine in orthopedic and trauma surgery: A cross-sectional survey on usage and needs

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## Complementary medicine in orthopedic and trauma surgery: A cross-sectional survey on usage and needs

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## Abstract

**Objectives:** Complementary and alternative medicine (CAM) is frequently used in Western countries within general medicine and internal medicine. Information on the use in orthopedics and trauma surgery is widely lacking. The aim of this study was to investigate usage and needs regarding CAM for these patients.

**Design:** Prospective paper-based, pseudo-anonymous, cross-sectional survey

**Setting:** From August to December 2018 a questionnaire, composed of 17 questions, was distributed to all eligible patients.

**Participants:** In-house patients in orthopedic and trauma surgery at a high-volume medical center in Germany

**Primary and secondary outcome measures:** Previous or current usage of CAM, interest and requests towards CAM as well as communication about CAM

**Results:** Overall, 457 orthopedic and trauma surgical patients took part in the survey. They were on average 52 years old and 54% were male. Most of the patients were admitted due to bone fractures and most underwent operative therapy. Previous or current CAM usage was stated by 76% and 30% of patients, respectively. Most of the patients stated to be interested in usage of CAM and demanded for more clinical usage of CAM and reliable information about CAM. More than 90% of patients did not discuss CAM interest or usage with their treating physicians. Patients stated that physicians should have knowledge about CAM. They wish to be treated in a holistic manner and want to strengthen self-efficacy.

**Conclusions:** Usage of CAM of patients in orthopedic and trauma surgery appears to be high. Only a few patients discuss their interest and usage of CAM with their treating physician. Therefore, surgeons should ask their patients about CAM and should consider evidence-based CAM approaches for complementary treatment.

**Trial registration:** German Clinical Trials Register (DRKS0001544)

(278 words)

Keywords: Acupuncture, herbal medicine, phytotherapy, surgery, Germany, questionnaire

## Summary: Strengths and limitations of this study

- In the absence of a validated questionnaire for orthopedic and trauma patients, a modified version of a previously used questionnaire was used.
- The high response rate of the survey strengthens the results.
- The survey might not be representative for the remaining parts of Germany and others countries as it was limited to one single area.

For peer review only

## Background

Complementary and alternative medicine (CAM) is a general term comprising a variety of diverse therapeutic approaches, which are not considered as a part of conventional medicine. Popular and commonly known examples are acupuncture as a part of the Traditional Chinese Medicine (TCM), phytotherapy, naturopathy and homeopathy as well as Anthroposophic Medicine. CAM is mostly used to complement conventional therapy and many CAM treatments contain elements to support self-efficacy of patients[1]. Many patients use CAM independently and without prior consultation of a physician[2,3]. Patients often consider CAM as safe, natural and devoid of harmful potential[4]. Patients' aims for usage of CAM are diverse: It is widely used in patients with non-life-threatening and self-limiting diseases such as respiratory and gastrointestinal infections[5]. But CAM is also popular in patients with chronic and life-limiting diseases like cancer[6]. Meanwhile, methods of CAM with proven evidence have found their way into various official treatment guidelines in Germany[7,8], some of them are also related to relief of pain[9,10]. In the field of orthopedic and trauma surgery CAM treatments have been found to be efficacious for example in chronic non-specific back pain and osteoarthritis of the knee[11,12]. However, less is known about the frequency of interest and usage of CAM in orthopedic and trauma surgical patients. Communication about CAM between attending physicians and patients appears to be poor; more than 80% of cancer patients from Switzerland were not asked about usage of CAM[4]. While it tells the physician about health related beliefs and preferences of the patient, which is important for good adherence and a patient-centered treatment, information about CAM use may also be a safety issue. Improper CAM usage means not only a financial burden for patients but also may cause inappropriate side effects and interactions with conventional medications, especially what herbal medicine is regarded[4,13]. This study aimed to evaluate the usage and demands regarding CAM in patients referred to a Department of orthopedics and trauma treatment.

## Methods

Between August and December 2018 a monocentric, paper-based, cross-sectional survey among orthopedic and trauma patients at a German Medical Center was conducted. The study was approved by the local ethical committee (EK-BR-49/18-1) and was conducted according to the Declaration of Helsinki. Written consent was obtained for all participants. All orthopedic and trauma surgical patients of all ages, all diagnoses and all treatments (surgical and non-surgical), who were admitted for inpatient treatment to the Department of Orthopedics, Trauma and Hand Surgery at the Medical Center, were consecutively screened for eligibility. Reasons for exclusion were cognitive impairment and inability to communicate (e. g. language barriers or due to physical condition). Out-patients and patients staying in intensive care unit were not considered. Patients received the questionnaire by an admission nurse during

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3 their admission procedure. To avoid response bias patients were asked to complete the questionnaire  
4 independently and on their own and return it pseudonymized to the nursing staff after finishing.  
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### 6 7 *Questionnaire*

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9 In the absence of a validated questionnaire for orthopedic and trauma patients, a modified version of a  
10 questionnaire was used, which was recently developed by the academic center for complementary and  
11 integrative medicine of the German state Baden Württemberg (AZKIM, www.azkim.de) for a CAM-  
12 survey among inpatients of 4 German University Hospitals[14]. The questionnaire contained 17  
13 questions which are related to socio-demographic aspects (insurance, age and gender), diagnosis (reason  
14 for hospitalization) and planned therapy. In a next set of questions the knowledge and usage of different  
15 types of CAM is respected. Current usage of CAM was asked by a yes-no-question. Further questions  
16 are on reasons for usage and experience with currently used CAM as well as reasons for non-usage of  
17 CAM and about communication between patients and their attending physician about CAM usage. At  
18 the end all patients had to state what is subjectively of importance for their treatment and what they  
19 would desire during hospital stay. The questionnaire is only available in German.  
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### 27 28 *Statistics*

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30 Population size and an error probability of 5% for a 95% confidence interval led to a calculated sample  
31 size of 384 patients. Since it was expected that a substantial number of admitted patients would not  
32 willing to consent to the study, number of cases was adjusted to 960 persons covering a non-participation  
33 rate of 60%. Questionnaires were numbered in sequence. Data were transferred in a pre-formed table  
34 (Microsoft Excel) by two authors. The database was closed before analysis of the data. Analysis was  
35 performed using IBM SPSS (Version 25.0). Descriptive analysis was performed for the whole cohort  
36 including all patients. Results are expressed as absolute values and percentage of patients, who answered  
37 the question (missing data was not interpolated). For analyzing influencing factors (gender, health and  
38 insurance status) on dichotomous variable “current CAM usage” linear regression was performed. For  
39 subgroup comparison (>65 years vs. ≤65 years, male vs. female) Chi-squared test or, in case of small  
40 sample numbers, Fisher’s exact tests were used.  $P < 0.05$  was considered as significant.  
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### 49 50 *Patient and public involvement*

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52 Patients or the public were not involved in the design, or conduct, or reporting, or  
53 dissemination plans of our research.  
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## Results

A total of 457 out of 1238 admitted patients (37%) could be included into the study, answered the questionnaire and were analyzed (see figure 1). Reasons for exclusion were cognitive impairment (n = 322), injury-related physical restriction (n = 148) and language barriers (n = 61). 250 patients refused to participate. Socio-demographic aspects of included patients are shown in table 1. 247 (54%) were male and 196 (43%) were female. Fourteen patients (3%) did not state their gender. Patients were on average 52 (range 17-93) years old. Only 9% (n = 39, always percentage of patients, who answered the question) of the patients had a private health insurance. Occurrence of bone fracture (n = 165, 37%) was the most common reason for hospital admission. More than 70% of the patients (n = 317, 72%) underwent operative therapy during their hospital stay. Almost 90% of patients (88%, n = 377) were hospitalized for emergency reasons.

**Table 1:** Health insurance status, reason for admission and planned therapy of study participants

\*Main reasons were removal of metal plates and other implants after surgery as well as inflammation of joints and tendon and shoulder injury

(Results are expressed as absolute values and percentage of patients, who answered the question)

	(n, %)
<b>Gender</b>	
male	247 (54%)
female	196 (43%)
not stated	14 (3%)
<b>Status of health insurance</b>	
statutory	400 (91%)
private	30 (7%)
supplementary	9 (2%)
<b>Reason for admission</b>	
Chronic back pain	3 (1%)
Acute back pain	15 (3%)
Bone fracture	165 (37%)
Ligament injury	29 (6%)
Metastatic cancer with bone lesions	3 (1%)
Endoscopic examination of a joint	10 (2%)
Joint replacement	16 (4%)
Concussion	16 (4%)
Accident	127 (28%)
Other*	65 (14%)
<b>Planned therapy</b>	
Operation	317 (72%)
Not operative	56 (13%)
I don't know	64 (15%)

*Popularity of CAM (figure 2 and 3)*

The most known therapy was acupuncture (n = 353, 81%), followed by motion therapy (n = 336, 79%), dietary supplements (n = 313, 75%) and yoga (n = 307, 73%). Least known were craniosacral therapy (n = 31, 8%), TCM (n = 120, 29%), probiotics (n = 146, 36%) and acupressure (n = 154, 38%). Patients were most interested in learning about TCM (n = 93, 23%). Patients added sporadically further approaches such as reflexology, hiking, fascial treatment, kinesiology, cupping, neural therapy and Feldenkrais.

All in all 76% of patients (n = 347) have been currently or in the past been using one or several of the listed CAM therapies, 30% (n = 139) were currently using CAM (figure 3). Most commonly currently or in the past used therapies were motion therapy (n = 203, 44%), followed by manual therapy (n = 161, 35%) and dietary supplements (n = 140, 31%). Only a few patients used craniosacral therapy (n = 18, 4%), TCM (n = 30, 7%) and acupressure (n = 32, 7%).

Table 2 shows currently usage of different CAM approaches and distinguish patients, who use CAM due to their current hospitalization complaint, and patients, who use CAM due to other reasons. The most currently used approaches due to their current hospitalization complaint were motion therapy (15%, n = 66) and manual therapy (9%, n = 39). Overall, besides motion therapy (23%, n = 107) and manual therapy (13%, n = 61), the most commonly used approach was application of dietary supplements (14%, n = 65).

**Table 2: Current CAM usage in relation to reason for current hospitalization**

(CAM = complementary and alternative medicine, TCM = Traditional Chinese Medicine; Results are expressed as absolute values and percentage of patients, who answered the question; multiple-answer question – patients could choose more than one approach)

Application due to current hospitalization complaint	Yes; n (%)	No; n (%)
Acupuncture	4 (1%)	7 (2%)
Acupressure	3 (1%)	4 (1%)
Homeopathy	7 (2%)	16 (4%)
Motion therapy	66 (15%)	41 (9%)
Relaxation therapy	11 (2%)	21 (5%)
Meditation	5 (1%)	13 (3%)
Osteopathy	8 (2%)	15 (3%)
Manual therapy	39 (9%)	22 (5%)
Chiropractic	2 (1%)	6 (1%)
Cranio sacral therapy	2 (1%)	7 (2%)
Phytotherapy	2 (1%)	21 (5%)
TCM	1 (1%)	7 (2%)
Yoga	7 (2%)	22 (5%)
Pilates	4 (1%)	13 (3%)
Dietary supplements	18 (4%)	47 (10%)
Probiotics	6 (1%)	14 (3%)

*Patients' requests (figure 4 and 5)*



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3 Almost 80% of patients stated that physicians should have knowledge about CAM (n = 282, 77%). CAM  
4 consultation (n = 281, 76%) as well as more information about self-efficacy (n = 330, 86%) was desired  
5 by most of the patients during their hospital stay. Treatment in holistic manner would be desirable for  
6 more than 80% of the patients (n = 312, 83%), and almost 90% stated that they want to make their own  
7 decision about therapy (n = 318, 87%). Also the patients desired that CAM should be covered by their  
8 health insurances. Hospitalized patients wish for more usage of CAM therapies as popularity of all in  
9 figure 5 shown mentioned approaches was more than 65%. Most popular were pain therapy (n = 292,  
10 86%) and motion therapy (n = 305, 87%).

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17 University CAM research is supported by more than 70% (n = 261, 73%). More than 80% of patients (n  
18 = 298, 83%) wish for reliable information about CAM.

### 19 20 *Patients with previously and currently usage of CAM (figure 6)*

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23 Comparison of socio-demographic aspects of patients with (n = 163) and without (n = 294) currently  
24 usage of CAM is shown in table 3. There was a higher percentage of females in the group with CAM  
25 usage (49 vs. 40%, p = 0.046). Other socio-demographic aspects were not different between the groups.  
26 Reasons for usage of CAM were body strengthening and health preservation (n = 123, 91%) and body  
27 support (n = 123, 89%). Only 23 (21%) patients stated that they used CAM because conventional therapy  
28 was ineffective and 42 (35%) patients reported to use CAM exclusively. CAM is perceived as a gentle  
29 therapeutic approach by more than half of the patients (n = 73, 63%), and more than 90% of patients (n  
30 = 112) rated CAM therapies as harmless. The most common reasons for termination of CAM usage  
31 were no further need of CAM in 78 patients (79%), followed by no or small effectiveness in 16 patients  
32 (39%) and too expensive therapy costs in 26 patients (37%). Side-effects occurred in 16 (13%) patients,  
33 but only 9 of them terminated CAM usage. More than 90% of patients (n = 119) would recommend  
34 CAM usage and almost 90% were satisfied with it (n = 113, 89%). Most of the patients stated  
35 recommendation for CAM usage was given by family doctors, other non-surgical attending physicians,  
36 physiotherapists or nurses (n = 55, 42%), followed by recommendation of family and friends (n = 36,  
37 27%). Media such as journals, internet or social media were used by 23 patients (18%). Alternative  
38 practitioners were only consulted by 9 patients (7%). Less than 30% of patients with currently CAM  
39 usage stated that they told their attending physician about CAM interest (n = 28) and CAM usage (n =  
40 27). Reasons for not-speaking of these patients were the feeling that there was no time for talking about  
41 it (n = 58, 56%) or an expectation of physicians' negative attitude towards CAM usage (n = 21, 23%)  
42 or that physician was the wrong contact regarding CAM (n = 16, 17%). Only 12 patients (17%) stated  
43 an expected incompetence of the physician.

### 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 **Table 3: Subgroup analysis: Socio-demographic differences of patients with and without** 59 **currently usage of CAM**

60 (CAM = complementary and alternative medicine; Results are expressed as absolute values and percentage of patients, who answered the question)

	<b>With CAM (n = 163)</b>	<b>Without CAM (n = 294)</b>	<b>P</b>
Sex (n male/female, %)	81/78 (51/49%)	151/101 (60/40%)	<b>0.046</b>
Age (years, range)	52 (17-92)	52 (17-93)	0.954
<b>Insurance (n, %)</b>			
statutory	146 (92%)	228 (92%)	0.806
private	10 (6%)	18 (7%)	
supplementary	3 (2%)	3 (1%)	
<b>Reason of admission (n, %)</b>			
Chronic back pain	2 (1%)	0 (0%)	0.707
Acute back pain	5 (3%)	6 (2%)	
Bone fracture	65 (40%)	90 (35%)	
Ligament injury	9 (6%)	18 (7%)	
Metastatic cancer with bone lesions	1 (1%)	2 (1%)	
Endoscopic examination of a joint	4 (3%)	6 (2%)	
Joint replacement	7 (4%)	7 (3%)	
Concussion	6 (4%)	10 (4%)	
Accident	41 (25%)	76 (30%)	
Other	21 (13%)	40 (16%)	
<b>Planned therapy</b>			
Operation	110 (70%)	186 (75%)	0.214
Not operative	19 (12%)	34 (14%)	
I don't know	28 (18%)	29 (11%)	

Of all patients with CAM experience only 15% (n = 42) reported usage of CAM to their attending physician. Reasons were the feeling that there was no time for talking about it (n = 120, 49%) or an expectation of physicians' negative attitude towards CAM usage (n = 35, 16%) or that physician was the wrong contact regarding CAM (n = 65, 30%). Only 10% (n = 22) stated an expected incompetence of the physician. Patients added further reasons for not-speaking about CAM interest and usage: No currently need for CAM usage (n = 25), no knowledge of CAM possibility (n = 23) and no interest regarding CAM (n = 5). Overall, only 12% (n = 44) of all patients, who answered questions about interest and usage of CAM (including also patients without knowledge of CAM experience), reported that they told their attending physician about CAM interest and only 12% (n = 45) told their physician about usage of CAM.

#### *Reasons for non-usage of CAM*

260 patients (41%) stated currently non-usage of CAM. Reported reasons were no necessity for CAM (n = 175, 67%), not-knowing of CAM possibility (n = 103, 40%), doubt about efficacy (n = 63, 24%) as well as too high costs of CAM (n = 63, 24%) and no current interest in CAM usage (n = 50, 19%). 31 patients (12%) stated to be afraid of side-effects. Patients added further reasons: Lack of CAM offering (n = 7) and not the right time for CAM usage (n = 4).

#### *Influence of gender, age and health insurance status*

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3 Linear regression analysis showed no significant influence of age, gender and health insurance status on  
4 current CAM usage. The elderly (> 65 years) had slightly less CAM usage compared to younger patients  
5 (36 vs. 39%), and all queried approaches of CAM were less known in the elderly. Large differences of  
6 knowledge were found in meditation (30 vs. 66%), chiropractic (23 vs. 49%), Yoga (51 vs. 79%) and  
7 Pilates (29 vs 61%). Interest in getting more familiar with CAM was slightly higher in the elderly (mean  
8 of all approaches: 13 vs. 11%). Discussion of interest and usage of CAM with physicians was more  
9 common in the population aged 65 years and older than in younger patients. Most CAM approaches  
10 were quite equally known by both sexes. Relaxation therapy was slightly more known in female than in  
11 male patients (67 vs. 53%). Interest in getting more familiar with different CAM approaches was similar  
12 in both sexes, but females wished also for more usage of CAM during hospital stays. Women used more  
13 frequently homeopathy (29 vs. 17%), relaxations techniques (30 vs. 20%), manual therapy (42 vs 30%),  
14 Yoga (27 vs 10%) and dietary supplements (36 vs. 26%) than men. Consultations about CAM (52 vs.  
15 35%) and self-efficacy (70 vs. 58%) as well as a holistic treatment (72 vs 61%) were more frequently  
16 favored by women. More female than male patients wished for more authority regarding their  
17 therapeutic decisions (72 vs. 58%).  
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## 30 Discussion

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33 To our knowledge, this is the first study investigating the demand and usage of CAM in orthopedic and  
34 trauma patients in Germany showing previous or current CAM usage in 76% and 30% of patients,  
35 respectively. Most of the patients stated an interest towards CAM underlining that CAM is also of  
36 interest in surgical patients. However, the results of surveys, especially of ones including retrospective  
37 questions, are always limited due to response bias and recall bias. Inclusion and exclusion criteria of our  
38 study were thoroughly chosen to ensure that patients had to be able to fill the questionnaire  
39 independently and on their own to avoid influence of relatives and nursing staff. But even though the  
40 questionnaire information text emphasized that the questionnaire did not affect medical treatment,  
41 patients' expectation that questionnaire might have an impact on their medical care could bias their  
42 response. Aiming to map also the experience with CAM in the past, the questionnaire asked for previous  
43 usage of CAM, making the results susceptible for a not avoidable recall bias. However, the observed  
44 CAM experience rate of 76% is similar to results of other surveys in Germany [5]. It is assumed that the  
45 CAM experience rate of surgical patients did not differ to the rate of the general German population.  
46 Strength of our survey is a robust response rate of 65%, which was higher than expected. Surveys in  
47 surgical patients are rare and the response rate is often lower than 30%[15–17]. The observed current  
48 usage rate of CAM in our study is in line with results of our studies, supporting validity of our study: A  
49 Canadian survey investigated the current usage of CAM in hepatobiliary surgical patients and found an  
50 usage rate of 27% summarizing a rate of 21% in non-cancer patients and of 34% in cancer patients[18].  
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3 Soós et al. found a current CAM usage rate of patients underwent surgery at the Department of Surgery  
4 of the Semmelweis University, Hungary of 27%, whereof higher rates were observed in cancer patients  
5 [17]. An American survey showed a current CAM usage rate of 25% in surgical patients[19]. Summing  
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7 up, it appears that nearly a third of surgical patients use CAM even during surgical treatment. But it has  
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9 to be taken into account, that patients without CAM interest may not fill in a questionnaire towards  
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11 CAM provoking false result of higher CAM usage rates. Nevertheless, as ours and other surveys in non-  
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13 surgical patients show, patients often use CAM by themselves and without prior consultation of their  
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15 attending physicians but desire that their physicians know about CAM[2,3,20]. Communication on  
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17 CAM was poor not only in our study. Most studies reported only one third of patients informing their  
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19 attending physician about usage of CAM[2,15,21,22]. Soós et al. found an even lower rate of 20% in  
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21 surgical patients[17]. In our study just a few patients told their attending surgeons about CAM, often  
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23 because they thought that there is no time for it. Whether this is a safety risk or not can to the present  
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25 knowledge only be speculated, because reliable data on the risk of non-communicated CAM are lacking.  
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27 At least for herbal preparations, which in rare cases can cause interactions with conventional medicine  
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29 or can interfere with coagulation[13,23,24], a more open communication would be desirable. The lack  
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31 of communication might also explain the gap between interest and usage of CAM. Interest in CAM was  
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33 clearly bigger than usage of CAM in our study. Similar observations were also made by others  
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35 emphasizing the importance of reliable CAM information for patients[15,17]. Wang et al. also reported  
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37 that patients who were not willing to incorporate CAM might be changing their mind, if a physician  
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39 would provide them reliable information about CAM underlining the importance of physicians' before  
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41 mentioned desired knowledge about CAM [19]. Patients using CAM reported that CAM was  
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43 recommended by their attending physician or other medical staff such as physiotherapist. Other studies  
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45 indicate that the strongest influence on patients regarding usage of CAM was given by family and friends  
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47 as well as attending physicians[19,20]. Additional, the demand of patients to be more included in the  
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49 decision-making process of therapy appears to be very high, as in our cohort more than 90% claimed to  
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51 have authority.

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53 Interestingly, it appears that CAM interest exists also in urgent condition as almost 90% of our study  
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55 patients were treated due to emergency reasons. Schieman et al. reported that one of the most common  
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57 causes for CAM usage in surgical patients was boosting of energy[18]. Bauer et al. found that more than  
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59 80% of cancer patients from a self-help group were interested in CAM in order to strengthen body's  
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own healing-forces[15]. This is in accordance with our results, as CAM users mostly stated that they do  
it to strengthen their healing capacity and resistance. The preferred CAM methods appear to vary  
according to different indications. Not surprising, patients with orthopedic diseases favor motion and  
manual therapies, whereas patients with cancer often prefer herbal medications and relaxation  
therapies[15,18,20]. Different to the results of others, chiropractic played only a minor role in our cohort.  
Especially studies from Northern America indicate higher usage rates of chiropractic indicating regional  
differences of preferred CAM approaches and limiting our results' transferability [18,19]. The frequency

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3 of CAM usage might also be affected by patients' health insurance status[4]. Private and statutory health  
4 insurances are covering different costs of CAM in Germany. Our study shows a slightly lower rate of  
5 private health insurance (7%) compared to overall private health insurance rate in Germany (7 vs. 12%  
6 as reported in 2017)[25]. Health insurance status in Germany depends on patients' income and the trial  
7 hospital is located in an area with a lower than average income[26]. Therefore, the difference might be  
8 attributable to the income of the patients. As mentioned before, the results of the survey might not be  
9 transferable as it was limited to one single location. Additional, it did not ask for further, potentially  
10 influencing socio-demographic differences such as educational status and nationality. The seen bigger  
11 interest of women in CAM has been reported in many publications and could be confirmed by our  
12 results[2,15,17,20] but the difference was only small. Despite all before mentioned limiting factors, the  
13 survey indicates that CAM appears to be of importance for surgical patients. For promoting an  
14 integrative surgery, further research is needed to investigate clinical relevance and applicability of CAM  
15 in surgery.  
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## 27 Conclusion

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29 This study was able to show interest of surgical patients regarding CAM in Germany. It emphasizes the  
30 importance of physicians' knowledge of CAM nowadays. As the percentage of CAM users among  
31 orthopedic and trauma patient is substantial and the need for information about CAM is high it would,  
32 from a patient centered perspective, be desirable if also surgeons and specialists in orthopedics are  
33 informed about CAM options in their field or at least can refer patients to physicians who are qualified  
34 in CAM. Additional, only a few patients discuss their interest and usage of CAM with their attending  
35 physician indicating the necessity to actively ask surgical patients for usage of CAM to recognize  
36 potential interaction effects of CAM on conventional treatment.  
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## 48 Abbreviations:

49 CAM: complementary and alternative medicine, TCM: Traditional Chinese Medicine  
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56 **Total word count: 3887 words**  
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**Data statement section:** Data is available on reasonable request to all interested researchers.

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### Author statement:

AK, RH and AKL are responsible for conception and design. Raw data was acquired by AK, NR and LS. Data was analyzed by AM and AKL. Statistical analysis was performed by AM and AKL. AKL wrote the manuscript with help of AK. LS and RH revised the article.

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### 13 **Figure legends**

14  
15 Figure 1: Process of screening, including and analysis of participants

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19 Figure 2: Popularity of CAM and interest in getting more knowledge about CAM

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23 Figure 3: Previously and currently usage of CAM

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27 Figure 4: Patients' treatment requests

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31 Figure 5: Request for CAM during hospital stay

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35 Figure 6: Attitude towards CAM and experience with previously used CAM

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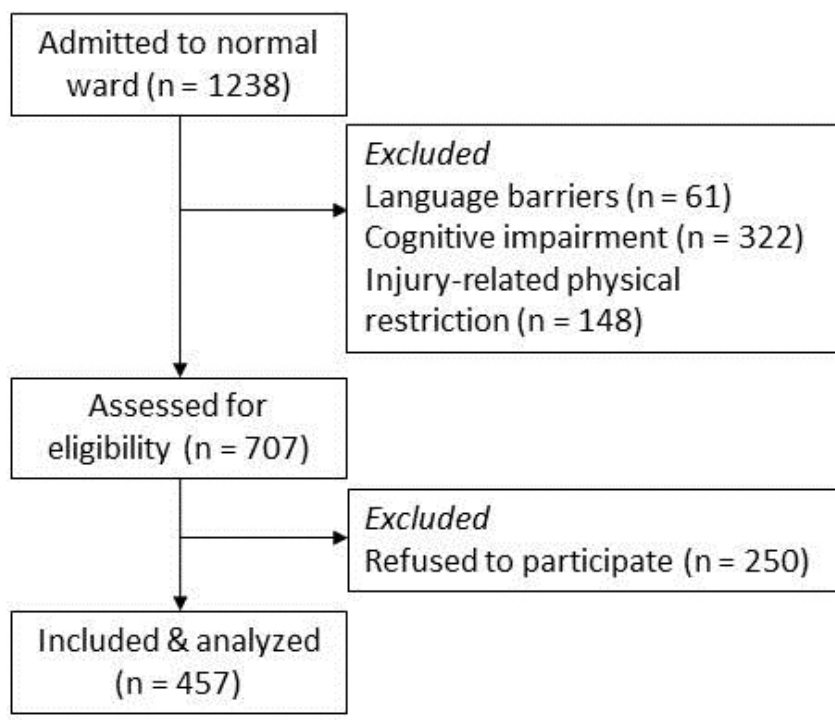
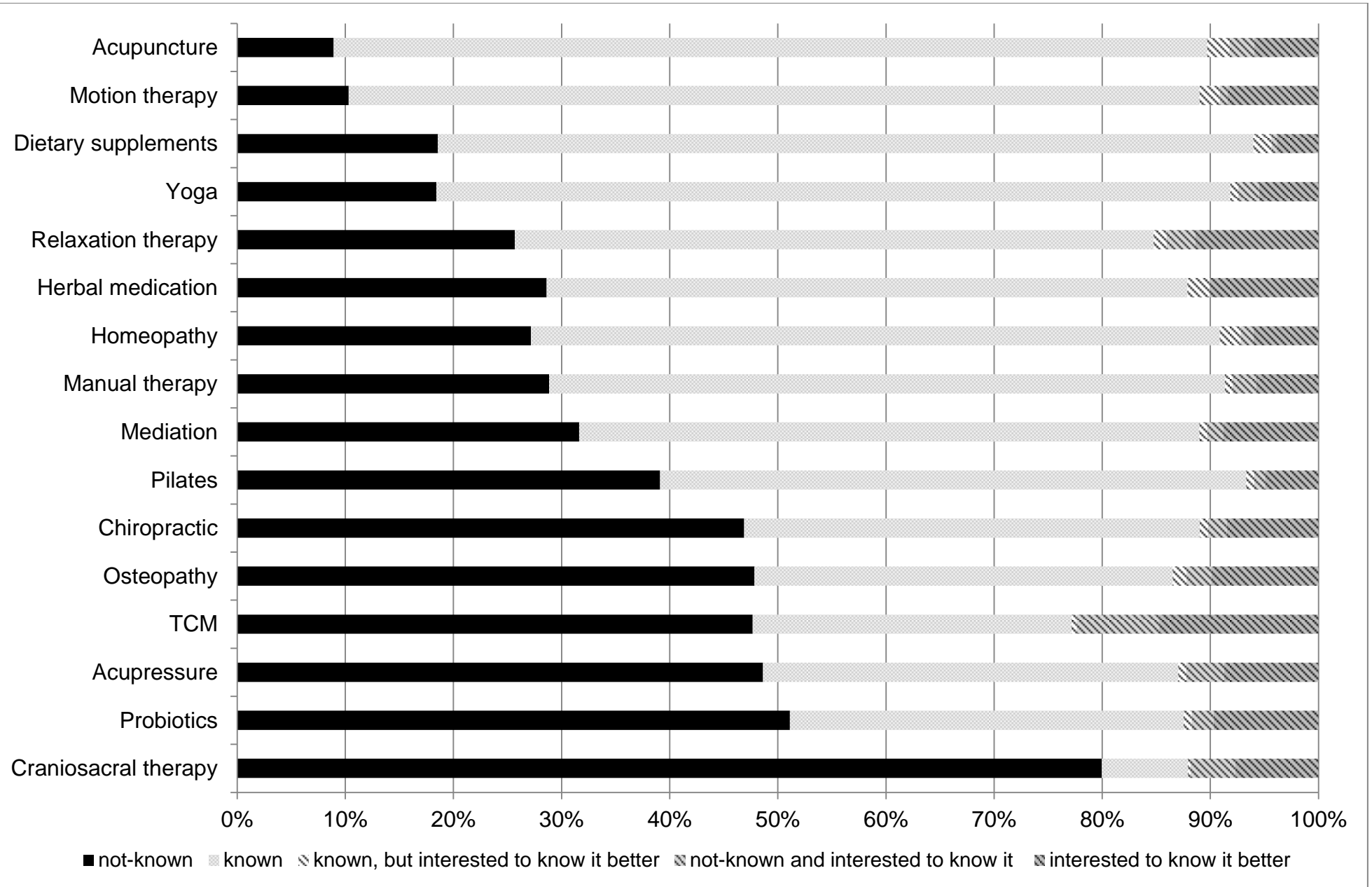
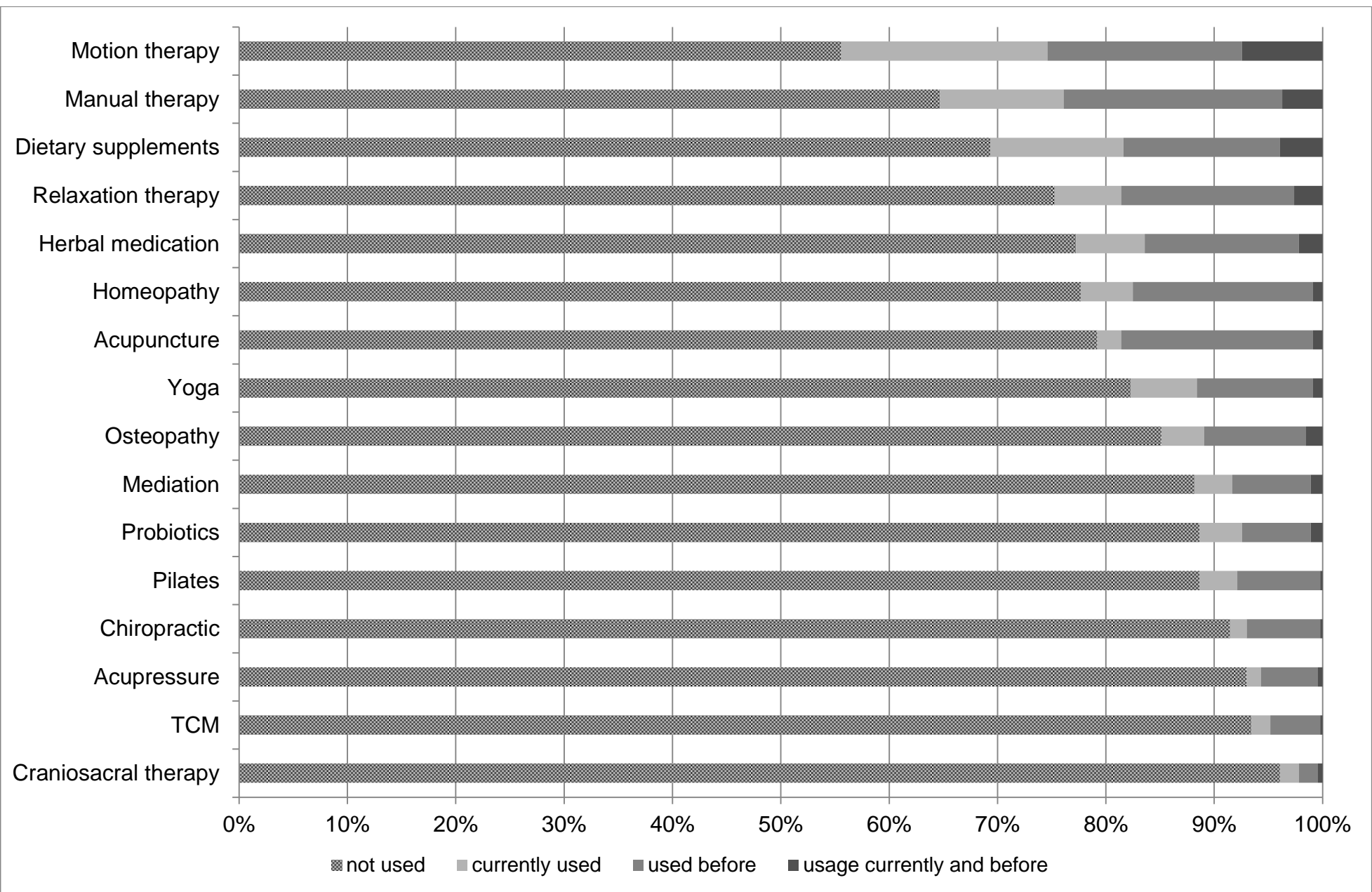


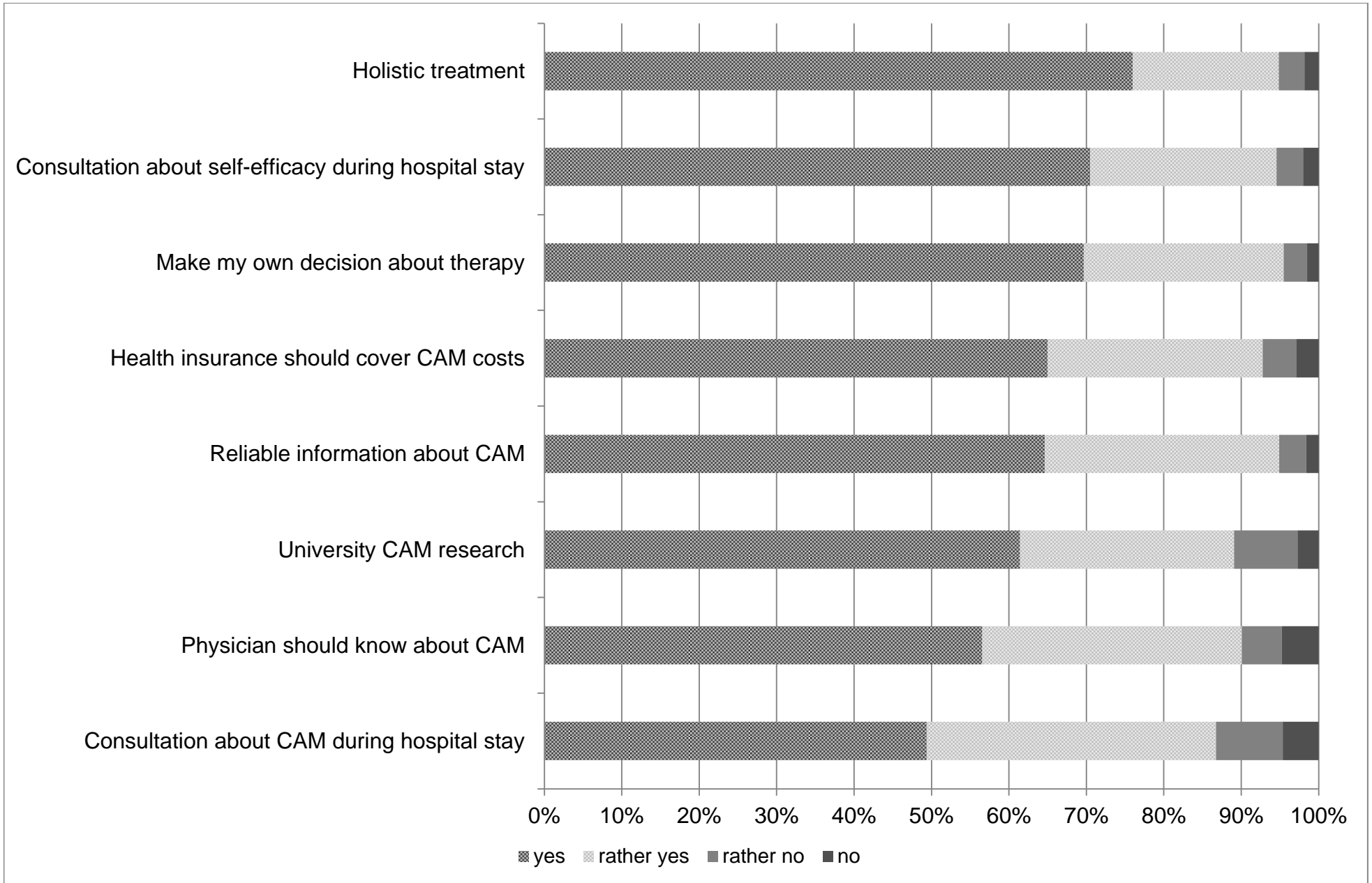
Figure 1: Process of screening, including and analysis of participants

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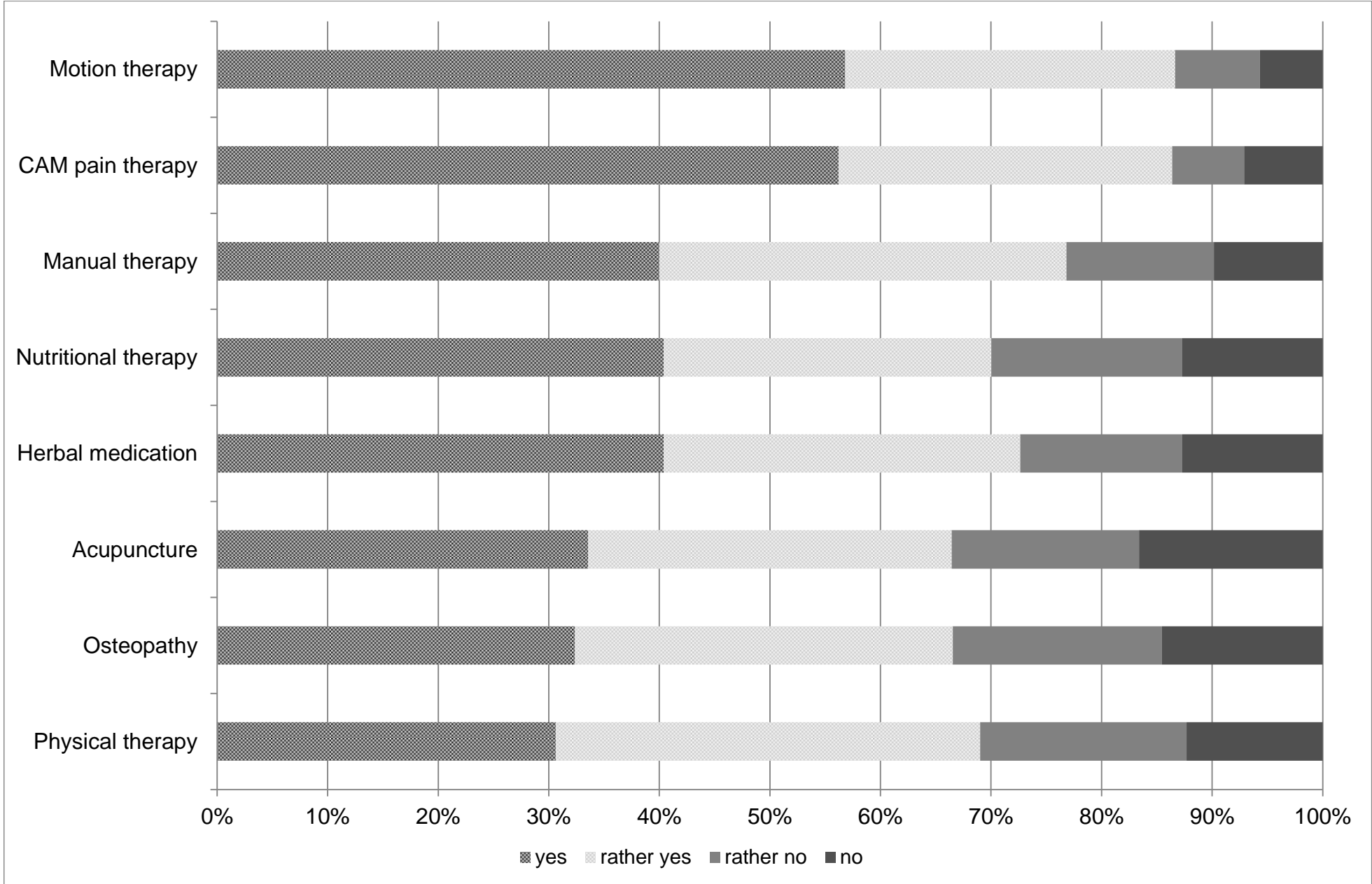


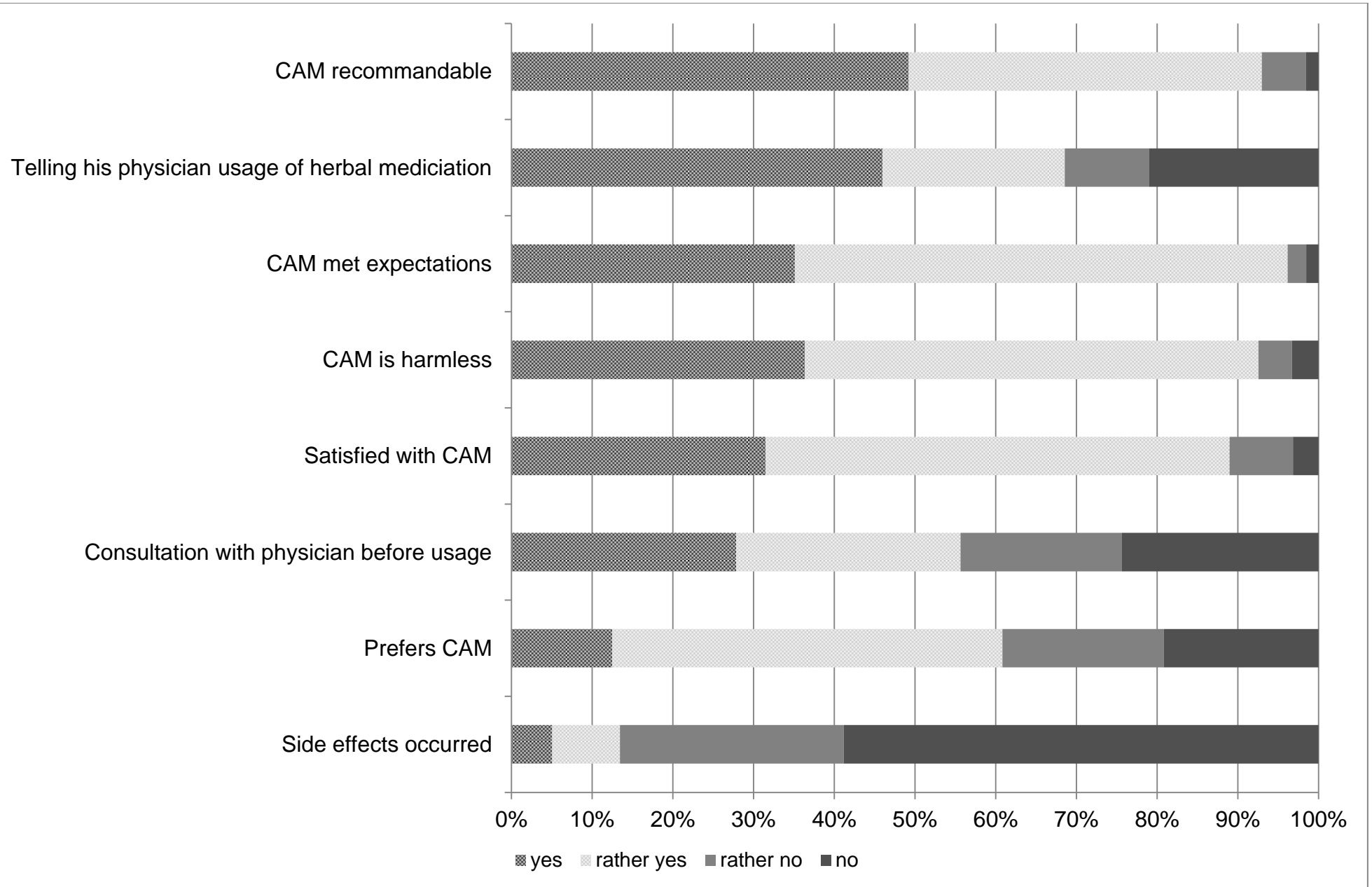


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## STROBE Statement—checklist of items that should be included in reports of observational studies

	Item No	Recommendation
<b>Title and abstract</b>	1	✓ (a) Indicate the study's design with a commonly used term in the title or the abstract ✓ (b) Provide in the abstract an informative and balanced summary of what was done and what was found
<b>Introduction</b>		
Background/rationale	2	✓ Explain the scientific background and rationale for the investigation being reported
Objectives	3	✓ State specific objectives, including any prespecified hypotheses
<b>Methods</b>		
Study design	4	✓ Present key elements of study design early in the paper
Setting	5	✓ Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection
Participants	6	<del>(a) Cohort study—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up</del> <del>Case-control study—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls</del> ✓ <i>Cross-sectional study</i> —Give the eligibility criteria, and the sources and methods of selection of participants <del>(b) Cohort study—For matched studies, give matching criteria and number of exposed and unexposed</del> <del>Case-control study—For matched studies, give matching criteria and the number of controls per case</del>
Variables	7	✓ Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. <del>Give diagnostic criteria, if applicable</del>
Data sources/ measurement	8*	✓ For each variable of interest, give sources of data and details of methods of assessment (measurement). <del>Describe comparability of assessment methods if there is more than one group</del>
Bias	9	✓ Describe any efforts to address potential sources of bias
Study size	10	✓ Explain how the study size was arrived at
Quantitative variables	11	✓ Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why
Statistical methods	12	✓ (a) Describe all statistical methods, including those used to control for confounding ✓ (b) Describe any methods used to examine subgroups and interactions ✓ (c) Explain how missing data were addressed <del>(d) Cohort study—If applicable, explain how loss to follow-up was addressed</del> <del>Case-control study—If applicable, explain how matching of cases and controls was addressed</del> ✓ <i>Cross-sectional study</i> —If applicable, describe analytical methods taking account of sampling strategy <del>(e) Describe any sensitivity analyses</del>

Continued on next page

**Results**

Participants	13*	<input checked="" type="checkbox"/> (a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed <input checked="" type="checkbox"/> (b) Give reasons for non-participation at each stage <input checked="" type="checkbox"/> (c) Consider use of a flow diagram
Descriptive data	14*	<input checked="" type="checkbox"/> (a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders <input checked="" type="checkbox"/> (b) Indicate number of participants with missing data for each variable of interest <input checked="" type="checkbox"/> (c) <del>Cohort study—Summarise follow-up time (eg, average and total amount)</del>
Outcome data	15*	<del>Cohort study—Report numbers of outcome events or summary measures over time</del> <del>Case-control study—Report numbers in each exposure category, or summary measures of exposure</del> <input checked="" type="checkbox"/> Cross-sectional study—Report numbers of outcome events or summary measures
Main results	16	<input checked="" type="checkbox"/> (a) Give unadjusted estimates <del>and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included</del> <input checked="" type="checkbox"/> (b) Report category boundaries when continuous variables were categorized <input checked="" type="checkbox"/> (c) <del>If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period</del>
Other analyses	17	<input checked="" type="checkbox"/> Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses

**Discussion**

Key results	18	<input checked="" type="checkbox"/> Summarise key results with reference to study objectives
Limitations	19	<input checked="" type="checkbox"/> Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias
Interpretation	20	<input checked="" type="checkbox"/> Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence
Generalisability	21	<input checked="" type="checkbox"/> Discuss the generalisability (external validity) of the study results

**Other information**

Funding	22	<input checked="" type="checkbox"/> Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based
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\*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

**Note:** An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at [www.strobe-statement.org](http://www.strobe-statement.org).



# BMJ Open

## Complementary medicine in orthopedic and trauma surgery: A cross-sectional survey on usage and needs

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## Complementary medicine in orthopedic and trauma surgery: A cross-sectional survey on usage and needs

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## Abstract

**Objectives:** Complementary and alternative medicine (CAM) is frequently used in Western countries within general medicine and internal medicine. Information on the use in orthopedics and trauma surgery is widely lacking. The aim of this study was to investigate usage and needs regarding CAM for these patients.

**Design:** Prospective paper-based, pseudo-anonymous, cross-sectional survey

**Setting:** From August to December 2018 a questionnaire, composed of 17 questions, was distributed to all eligible patients.

**Participants:** In-house patients in orthopedic and trauma surgery at a high-volume medical center in Germany

**Primary and secondary outcome measures:** Previous or current usage of CAM, interest and requests towards CAM as well as communication about CAM

**Results:** Overall, 457 orthopedic and trauma surgical patients took part in the survey. They were on average 52 years old and 54% were male. Most of the patients were admitted due to bone fractures and most underwent operative therapy. Previous or current CAM usage was stated by 76% and 30% of patients, respectively. Most of the patients stated to be interested in usage of CAM and demanded for more clinical usage of CAM and reliable information about CAM. More than 90% of patients did not discuss CAM interest or usage with their treating physicians. Patients stated that physicians should have knowledge about CAM. They wish to be treated in a holistic manner and want to strengthen self-efficacy.

**Conclusions:** Usage of CAM of patients in orthopedic and trauma surgery appears to be high. Only a few patients discuss their interest and usage of CAM with their treating physician. Therefore, surgeons should ask their patients about CAM and should consider evidence-based CAM approaches for complementary treatment.

**Trial registration:** German Clinical Trials Register (DRKS0001544)

(278 words)

Keywords: Acupuncture, herbal medicine, phytotherapy, surgery, Germany, questionnaire

## Summary: Strengths and limitations of this study

- In the absence of a validated questionnaire for orthopedic and trauma patients, a modified version of a previously used questionnaire was used.
- The high response rate of the survey strengthens the results.
- The survey might not be representative for the remaining parts of Germany and others countries as it was limited to one single area.

For peer review only

## Background

Complementary and alternative medicine (CAM) is a general term comprising a variety of diverse therapeutic approaches, which are not considered as a part of conventional medicine. Popular and commonly known examples are acupuncture as a part of the Traditional Chinese Medicine (TCM), phytotherapy, naturopathy and homeopathy as well as Anthroposophic Medicine. CAM is mostly used to complement conventional therapy and many CAM treatments contain elements to support self-efficacy of patients[1]. Many patients use CAM independently and without prior consultation of a physician[2,3]. Patients often consider CAM as safe, natural and devoid of harmful potential[4]. Patients' aims for usage of CAM are diverse: It is widely used in patients with non-life-threatening and self-limiting diseases such as respiratory and gastrointestinal infections[5]. But CAM is also popular in patients with chronic and life-limiting diseases like cancer[6]. Meanwhile, methods of CAM with proven evidence have found their way into various official treatment guidelines in Germany[7,8], some of them are also related to relief of pain[9,10]. In the field of orthopedic and trauma surgery CAM treatments have been found to be efficacious for example in chronic non-specific back pain and osteoarthritis of the knee[11,12]. However, less is known about the frequency of interest and usage of CAM in orthopedic and trauma surgical patients. Communication about CAM between attending physicians and patients appears to be poor; more than 80% of cancer patients from Switzerland were not asked about usage of CAM[4]. While it tells the physician about health related beliefs and preferences of the patient, which is important for good adherence and a patient-centered treatment, information about CAM use may also be a safety issue. Improper CAM usage means not only a financial burden for patients but also may cause inappropriate side effects and interactions with conventional medications, especially what herbal medicine is regarded[4,13]. This study aimed to evaluate the usage and demands regarding CAM in patients referred to a Department of orthopedics and trauma treatment.

## Methods

Between August and December 2018 a monocentric, paper-based, cross-sectional survey among orthopedic and trauma patients at a German Medical Center was conducted. The study was approved by the local ethical committee (EK-BR-49/18-1) and was conducted according to the Declaration of Helsinki. Written consent was obtained for all participants. All orthopedic and trauma surgical patients of all ages, all diagnoses and all treatments (surgical and non-surgical), who were admitted for inpatient treatment to the Department of Orthopedics, Trauma and Hand Surgery at the Medical Center, were consecutively screened for eligibility. Reasons for exclusion were cognitive impairment and inability to communicate (e. g. language barriers or due to physical condition). Out-patients and patients staying in intensive care unit were not considered. Patients received the questionnaire by an admission nurse during

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3 their admission procedure. To avoid response bias patients were asked to complete the questionnaire  
4 independently and on their own and return it pseudonymized to the nursing staff after finishing.  
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### 6 7 *Questionnaire*

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9 In the absence of a validated questionnaire for orthopedic and trauma patients, a modified version of a  
10 questionnaire was used, which was recently developed by the academic center for complementary and  
11 integrative medicine of the German state Baden Württemberg (AZKIM, [www.azkim.de](http://www.azkim.de)) for a CAM-  
12 survey among inpatients of 4 German University Hospitals[14]. The questionnaire contained 17  
13 questions which are related to socio-demographic aspects (insurance, age and gender), diagnosis (reason  
14 for hospitalization) and planned therapy. In a next set of questions the knowledge and usage of different  
15 types of CAM is respected. Current usage of CAM was asked by a yes-no-question. Further questions  
16 are on reasons for usage and experience with currently used CAM as well as reasons for non-usage of  
17 CAM and about communication between patients and their attending physician about CAM usage. At  
18 the end all patients had to state what is subjectively of importance for their treatment and what they  
19 would desire during hospital stay. The questionnaire is only available in German.  
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### 27 28 *Statistics*

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30 Population size and an error probability of 5% for a 95% confidence interval led to a calculated sample  
31 size of 384 patients. Since it was expected that a substantial number of admitted patients would not  
32 willing to consent to the study, number of cases was adjusted to 960 persons covering a non-participation  
33 rate of 60%. Questionnaires were numbered in sequence. Data were transferred in a pre-formed table  
34 (Microsoft Excel) by two authors. The database was closed before analysis of the data. Analysis was  
35 performed using IBM SPSS (Version 25.0). Descriptive analysis was performed for the whole cohort  
36 including all patients. Results are expressed as absolute values and percentage of patients, who answered  
37 the question (missing data was not interpolated). For analyzing influencing factors (gender, health and  
38 insurance status) on dichotomous variable “current CAM usage” logistic regression was performed. For  
39 subgroup comparison (>65 years vs. ≤65 years, male vs. female) Chi-squared test or, in case of small  
40 sample numbers, Fisher’s exact tests were used.  $P < 0.05$  was considered as significant.  
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### 48 49 *Patient and public involvement*

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51 Patients or the public were not involved in the design, or conduct, or reporting, or  
52 dissemination plans of our research.  
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## Results

A total of 457 out of 1238 admitted patients (37%) could be included into the study, answered the questionnaire and were analyzed (see figure 1). Reasons for exclusion were cognitive impairment (n = 322), injury-related physical restriction (n = 148) and language barriers (n = 61). 250 patients refused to participate. Socio-demographic aspects of included patients are shown in table 1. 247 (54%) were male and 196 (43%) were female. Fourteen patients (3%) did not state their gender. Patients were on average 52 (range 17-93) years old. Only 9% (n = 39, always percentage of patients, who answered the question) of the patients had a private health insurance. Occurrence of bone fracture (n = 165, 37%) was the most common reason for hospital admission. More than 70% of the patients (n = 317, 72%) underwent operative therapy during their hospital stay. Almost 90% of patients (88%, n = 377) were hospitalized for emergency reasons.

**Table 1:** Health insurance status, reason for admission and planned therapy of study participants

\*Main reasons were removal of metal plates and other implants after surgery as well as inflammation of joints and tendon and shoulder injury

(Results are expressed as absolute values and percentage of patients, who answered the question)

	(n, %)
<b>Gender</b>	
male	247 (54%)
female	196 (43%)
not stated	14 (3%)
<b>Status of health insurance</b>	
statutory	400 (91%)
private	30 (7%)
supplementary	9 (2%)
<b>Reason for admission</b>	
Chronic back pain	3 (1%)
Acute back pain	15 (3%)
Bone fracture	165 (37%)
Ligament injury	29 (6%)
Metastatic cancer with bone lesions	3 (1%)
Endoscopic examination of a joint	10 (2%)
Joint replacement	16 (4%)
Concussion	16 (4%)
Accident	127 (28%)
Other*	65 (14%)
<b>Planned therapy</b>	
Operation	317 (72%)
Not operative	56 (13%)
I don't know	64 (15%)

*Popularity of CAM*



Summary of results visualizing popularity of CAM and interest in getting more knowledge about CAM is shown in figure 2. The most known therapy was acupuncture (n = 353, 81%), followed by motion therapy (n = 336, 79%), dietary supplements (n = 313, 75%) and yoga (n = 307, 73%). Least known were craniosacral therapy (n = 31, 8%), TCM (n = 120, 29%), probiotics (n = 146, 36%) and acupressure (n = 154, 38%). Patients were most interested in learning about TCM (n = 93, 23%). Patients added sporadically further approaches such as reflexology, hiking, fascial treatment, kinesiology, cupping, neural therapy and Feldenkrais.

Frequency of usage of different types of CAM is shown in figure 3. All in all, 76% of patients (n = 347) have been currently or in the past been using one or several of the listed CAM therapies, 30% (n = 139) were currently using CAM (figure 3). Most commonly currently or in the past used therapies were motion therapy (n = 203, 44%), followed by manual therapy (n = 161, 35%) and dietary supplements (n = 140, 31%). Only a few patients used craniosacral therapy (n = 18, 4%), TCM (n = 30, 7%) and acupressure (n = 32, 7%).

Table 2 shows currently usage of different CAM approaches and distinguish patients, who use CAM due to their current hospitalization complaint, and patients, who use CAM due to other reasons. The most currently used approaches due to their current hospitalization complaint were motion therapy (15%, n = 66) and manual therapy (9%, n = 39). Overall, besides motion therapy (23%, n = 107) and manual therapy (13%, n = 61), the most commonly used approach was application of dietary supplements (14%, n = 65).

**Table 2: Current CAM usage in relation to reason for current hospitalization**

(CAM = complementary and alternative medicine, TCM = Traditional Chinese Medicine; Results are expressed as absolute values and percentage of patients, who answered the question; multiple-answer question – patients could choose more than one approach)

Application due to current hospitalization complaint	Yes; n (%)	No; n (%)
Acupuncture	4 (1%)	7 (2%)
Acupressure	3 (1%)	4 (1%)
Homeopathy	7 (2%)	16 (4%)
Motion therapy	66 (15%)	41 (9%)
Relaxation therapy	11 (2%)	21 (5%)
Meditation	5 (1%)	13 (3%)
Osteopathy	8 (2%)	15 (3%)
Manual therapy	39 (9%)	22 (5%)
Chiropractic	2 (1%)	6 (1%)
Cranio sacral therapy	2 (1%)	7 (2%)
Phytotherapy	2 (1%)	21 (5%)
TCM	1 (1%)	7 (2%)
Yoga	7 (2%)	22 (5%)
Pilates	4 (1%)	13 (3%)
Dietary supplements	18 (4%)	47 (10%)
Probiotics	6 (1%)	14 (3%)

### *Patients' requests*

Patients' requests regarding CAM are shown in figure 4. Almost 80% of patients stated that physicians should have knowledge about CAM (n = 282, 77%). CAM consultation (n = 281, 76%) as well as more information about self-efficacy (n = 330, 86%) was desired by most of the patients during their hospital stay. Treatment in holistic manner would be desirable for more than 80% of the patients (n = 312, 83%), and almost 90% stated that they want to make their own decision about therapy (n = 318, 87%). Also the patients desired that CAM should be covered by their health insurances. Hospitalized patients wish for more usage of CAM therapies as popularity of all in figure 5 shown mentioned approaches was more than 65%. Most popular were pain therapy (n = 292, 86%) and motion therapy (n = 305, 87%).

University CAM research is supported by more than 70% (n = 261, 73%). More than 80% of patients (n = 298, 83%) wish for reliable information about CAM.

### *Patients with previously and currently usage of CAM*

Comparison of socio-demographic aspects of patients with (n = 163) and without (n = 294) currently usage of CAM is shown in table 3. There was a higher percentage of females in the group with CAM usage (49 vs. 40%, p = 0.046). Other socio-demographic aspects were not different between the groups. Reasons for usage of CAM were body strengthening and health preservation (n = 123, 91%) and body support (n = 123, 89%). Only 23 (21%) patients stated that they used CAM because conventional therapy was ineffective and 42 (35%) patients reported to use CAM exclusively. CAM is perceived as a gentle therapeutic approach by more than half of the patients (n = 73, 63%), and more than 90% of patients (n = 112) rated CAM therapies as harmless. The most common reasons for termination of CAM usage were no further need of CAM in 78 patients (79%), followed by no or small effectiveness in 16 patients (39%) and too expensive therapy costs in 26 patients (37%). Figure 6 shows the experience of patients with CAM. Side-effects occurred in 16 (13%) patients, but only 9 of them terminated CAM usage. More than 90% of patients (n = 119) would recommend CAM usage and almost 90% were satisfied with it (n = 113, 89%). Most of the patients stated recommendation for CAM usage was given by family doctors, other non-surgical attending physicians, physiotherapists or nurses (n = 55, 42%), followed by recommendation of family and friends (n = 36, 27%). Media such as journals, internet or social media were used by 23 patients (18%). Alternative practitioners were only consulted by 9 patients (7%). Less than 30% of patients with currently CAM usage stated that they told their attending physician about CAM interest (n = 28) and CAM usage (n = 27). Reasons for not-speaking of these patients were the feeling that there was no time for talking about it (n = 58, 56%) or an expectation of physicians' negative attitude towards CAM usage (n = 21, 23%) or that physician was the wrong contact regarding CAM (n = 16, 17%). Only 12 patients (17%) stated an expected incompetence of the physician.

### **Table 3: Subgroup analysis: Socio-demographic differences of patients with and without currently usage of CAM**

(CAM = complementary and alternative medicine; Results are expressed as absolute values and percentage of patients, who answered the

question)

	<b>With CAM (n = 163)</b>	<b>Without CAM (n = 294)</b>	<b>P</b>
Sex (n male/female, %)	81/78 (51/49%)	151/101 (60/40%)	<b>0.046</b>
Age (years, range)	52 (17-92)	52 (17-93)	0.954
<b>Insurance (n, %)</b>			
statutory	146 (92%)	228 (92%)	0.806
private	10 (6%)	18 (7%)	
supplementary	3 (2%)	3 (1%)	
<b>Reason of admission (n, %)</b>			
Chronic back pain	2 (1%)	0 (0%)	0.707
Acute back pain	5 (3%)	6 (2%)	
Bone fracture	65 (40%)	90 (35%)	
Ligament injury	9 (6%)	18 (7%)	
Metastatic cancer with bone lesions	1 (1%)	2 (1%)	
Endoscopic examination of a joint	4 (3%)	6 (2%)	
Joint replacement	7 (4%)	7 (3%)	
Concussion	6 (4%)	10 (4%)	
Accident	41 (25%)	76 (30%)	
Other	21 (13%)	40 (16%)	
<b>Planned therapy</b>			
Operation	110 (70%)	186 (75%)	0.214
Not operative	19 (12%)	34 (14%)	
I don't know	28 (18%)	29 (11%)	

Of all patients with CAM experience only 15% (n = 42) reported usage of CAM to their attending physician. Reasons were the feeling that there was no time for talking about it (n = 120, 49%) or an expectation of physicians' negative attitude towards CAM usage (n = 35, 16%) or that physician was the wrong contact regarding CAM (n = 65, 30%). Only 10% (n = 22) stated an expected incompetence of the physician. Patients added further reasons for not-speaking about CAM interest and usage: No currently need for CAM usage (n = 25), no knowledge of CAM possibility (n = 23) and no interest regarding CAM (n = 5). Overall, only 12% (n = 44) of all patients, who answered questions about interest and usage of CAM (including also patients without knowledge of CAM experience), reported that they told their attending physician about CAM interest and only 12% (n = 45) told their physician about usage of CAM.

#### *Reasons for non-usage of CAM*

260 patients (41%) stated currently non-usage of CAM. Reported reasons were no necessity for CAM (n = 175, 67%), not-knowing of CAM possibility (n = 103, 40%), doubt about efficacy (n = 63, 24%) as well as too high costs of CAM (n = 63, 24%) and no current interest in CAM usage (n = 50, 19%). 31 patients (12%) stated to be afraid of side-effects. Patients added further reasons: Lack of CAM offering (n = 7) and not the right time for CAM usage (n = 4).

#### *Subgroup analysis: Influence of gender, age and health insurance status*

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3 Logistic regression analysis showed no significant influence of age, gender and health insurance status  
4 on current CAM usage. The elderly (> 65 years) had slightly less CAM usage compared to younger  
5 patients (36 vs. 39%), and all queried approaches of CAM were less known in the elderly. Large  
6 differences of knowledge were found in meditation (30 vs. 66%), chiropractic (23 vs. 49%), Yoga (51  
7 vs. 79%) and Pilates (29 vs 61%). Interest in getting more familiar with CAM was slightly higher in the  
8 elderly (mean of all approaches: 13 vs. 11%). Discussion of interest and usage of CAM with physicians  
9 was more common in the population aged 65 years and older than in younger patients. Most CAM  
10 approaches were quite equally known by both sexes. Relaxation therapy was slightly more known in  
11 female than in male patients (67 vs. 53%). Interest in getting more familiar with different CAM  
12 approaches was similar in both sexes, but females wished also for more usage of CAM during hospital  
13 stays. Women used more frequently homeopathy (29 vs. 17%), relaxations techniques (30 vs. 20%),  
14 manual therapy (42 vs 30%), Yoga (27 vs 10%) and dietary supplements (36 vs. 26%) than men.  
15 Consultations about CAM (52 vs. 35%) and self-efficacy (70 vs. 58%) as well as a holistic treatment  
16 (72 vs 61%) were more frequently favored by women. More female than male patients wished for more  
17 authority regarding their therapeutic decisions (72 vs. 58%).  
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## 30 Discussion

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33 To our knowledge, this is the first study investigating the demand and usage of CAM in orthopedic and  
34 trauma patients in Germany showing previous or current CAM usage in 76% and 30% of patients,  
35 respectively. Most of the patients stated an interest towards CAM underlining that CAM is also of  
36 interest in surgical patients. However, the results of surveys, especially of ones including retrospective  
37 questions, are always limited due to response bias and recall bias. Inclusion and exclusion criteria of our  
38 study were thoroughly chosen to ensure that patients had to be able to fill the questionnaire  
39 independently and on their own to avoid influence of relatives and nursing staff. But even though the  
40 questionnaire information text emphasized that the questionnaire did not affect medical treatment,  
41 patients' expectation that questionnaire might have an impact on their medical care could bias their  
42 response. Aiming to map also the experience with CAM in the past, the questionnaire asked for previous  
43 usage of CAM, making the results susceptible for a not avoidable recall bias. However, the observed  
44 CAM experience rate of 76% is similar to results of other surveys in Germany [5]. It is assumed that the  
45 CAM experience rate of surgical patients did not differ to the rate of the general German population.  
46 Strength of our survey is a robust response rate of 65%, which was higher than expected. Surveys in  
47 surgical patients are rare and the response rate is often lower than 30%[15–17]. The observed current  
48 usage rate of CAM in our study is in line with results of our studies, supporting validity of our study: A  
49 Canadian survey investigated the current usage of CAM in hepatobiliary surgical patients and found an  
50 usage rate of 27% summarizing a rate of 21% in non-cancer patients and of 34% in cancer patients[18].  
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3 Soós et al. found a current CAM usage rate of patients underwent surgery at the Department of Surgery  
4 of the Semmelweis University, Hungary of 27%, whereof higher rates were observed in cancer patients  
5 [17]. An American survey showed a current CAM usage rate of 25% in surgical patients[19]. Summing  
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7 up, it appears that nearly a third of surgical patients use CAM even during surgical treatment. But it has  
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9 to be taken into account, that patients without CAM interest may not fill in a questionnaire towards  
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11 CAM provoking false result of higher CAM usage rates. Nevertheless, as ours and other surveys in non-  
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13 surgical patients show, patients often use CAM by themselves and without prior consultation of their  
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15 attending physicians but desire that their physicians know about CAM[2,3,20]. Communication on  
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17 CAM was poor not only in our study. Most studies reported only one third of patients informing their  
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19 attending physician about usage of CAM[2,15,21,22]. Soós et al. found an even lower rate of 20% in  
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21 surgical patients[17]. In our study just a few patients told their attending surgeons about CAM, often  
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23 because they thought that there is no time for it. Whether this is a safety risk or not can to the present  
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25 knowledge only be speculated, because reliable data on the risk of non-communicated CAM are lacking.  
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27 At least for herbal preparations, which in rare cases can cause interactions with conventional medicine  
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29 or can interfere with coagulation[13,23,24], a more open communication would be desirable. The lack  
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31 of communication might also explain the gap between interest and usage of CAM. Interest in CAM was  
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33 clearly bigger than usage of CAM in our study. Similar observations were also made by others  
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35 emphasizing the importance of reliable CAM information for patients[15,17]. Wang et al. also reported  
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37 that patients who were not willing to incorporate CAM might be changing their mind, if a physician  
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39 would provide them reliable information about CAM underlining the importance of physicians' before  
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41 mentioned desired knowledge about CAM [19]. Patients using CAM reported that CAM was  
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43 recommended by their attending physician or other medical staff such as physiotherapist. Other studies  
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45 indicate that the strongest influence on patients regarding usage of CAM was given by family and friends  
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47 as well as attending physicians[19,20]. Additional, the demand of patients to be more included in the  
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49 decision-making process of therapy appears to be very high, as in our cohort more than 90% claimed to  
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51 have authority.

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53 Interestingly, it appears that CAM interest exists also in urgent condition as almost 90% of our study  
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55 patients were treated due to emergency reasons. Schieman et al. reported that one of the most common  
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57 causes for CAM usage in surgical patients was boosting of energy[18]. Bauer et al. found that more than  
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59 80% of cancer patients from a self-help group were interested in CAM in order to strengthen body's  
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own healing-forces[15]. This is in accordance with our results, as CAM users mostly stated that they do  
it to strengthen their healing capacity and resistance. The preferred CAM methods appear to vary  
according to different indications. Not surprising, patients with orthopedic diseases favor motion and  
manual therapies, whereas patients with cancer often prefer herbal medications and relaxation  
therapies[15,18,20]. Different to the results of others, chiropractic played only a minor role in our cohort.  
Especially studies from Northern America indicate higher usage rates of chiropractic indicating regional  
differences of preferred CAM approaches and limiting our results' transferability [18,19]. The frequency

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3 of CAM usage might also be affected by patients' health insurance status[4]. Private and statutory health  
4 insurances are covering different costs of CAM in Germany. Our study shows a slightly lower rate of  
5 private health insurance (7%) compared to overall private health insurance rate in Germany (7 vs. 12%  
6 as reported in 2017)[25]. Health insurance status in Germany depends on patients' income and the trial  
7 hospital is located in an area with a lower than average income[26]. Therefore, the difference might be  
8 attributable to the income of the patients. As mentioned before, the results of the survey might not be  
9 transferable as it was limited to one single location. Additionally, it did not ask for further, potentially  
10 influencing socio-demographic differences such as educational status and nationality. The seen bigger  
11 interest of women in CAM has been reported in many publications and could be confirmed by our  
12 results[2,15,17,20] but the difference was only small, and the result of subgroup analysis is always  
13 limited by its exploratory character showing just tendencies for further research. Despite all before  
14 mentioned limiting factors, the survey indicates that CAM appears to be of importance for surgical  
15 patients. For promoting an integrative surgery, further research is needed to investigate clinical  
16 relevance and applicability of CAM in surgery.  
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## 29 Conclusion

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31 This study was able to show interest of surgical patients regarding CAM in Germany. It emphasizes the  
32 importance of physicians' knowledge of CAM nowadays. As the percentage of CAM users among  
33 orthopedic and trauma patient is substantial and the need for information about CAM is high it would,  
34 from a patient centered perspective, be desirable if also surgeons and specialists in orthopedics are  
35 informed about CAM options in their field or at least can refer patients to physicians who are qualified  
36 in CAM. Additionally, only a few patients discuss their interest and usage of CAM with their attending  
37 physician indicating the necessity to actively ask surgical patients for usage of CAM to recognize  
38 potential interaction effects of CAM on conventional treatment.  
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## 49 Abbreviations:

50 CAM: complementary and alternative medicine, TCM: Traditional Chinese Medicine  
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AK, RH and AKL are responsible for conception and design. Raw data was acquired by AK, NR and LS. Data was analyzed by AM and AKL. Statistical analysis was performed by AM and AKL. AKL wrote the manuscript with help of AK. LS and RH revised the article.

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### 13 **Figure legends**

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15 Figure 1: Process of screening, including and analysis of participants

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19 Figure 2: Popularity of CAM and interest in getting more knowledge about CAM

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23 Figure 3: Previously and currently usage of CAM

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27 Figure 4: Patients' treatment requests

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31 Figure 5: Request for CAM during hospital stay

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35 Figure 6: Attitude towards CAM and experience with previously used CAM

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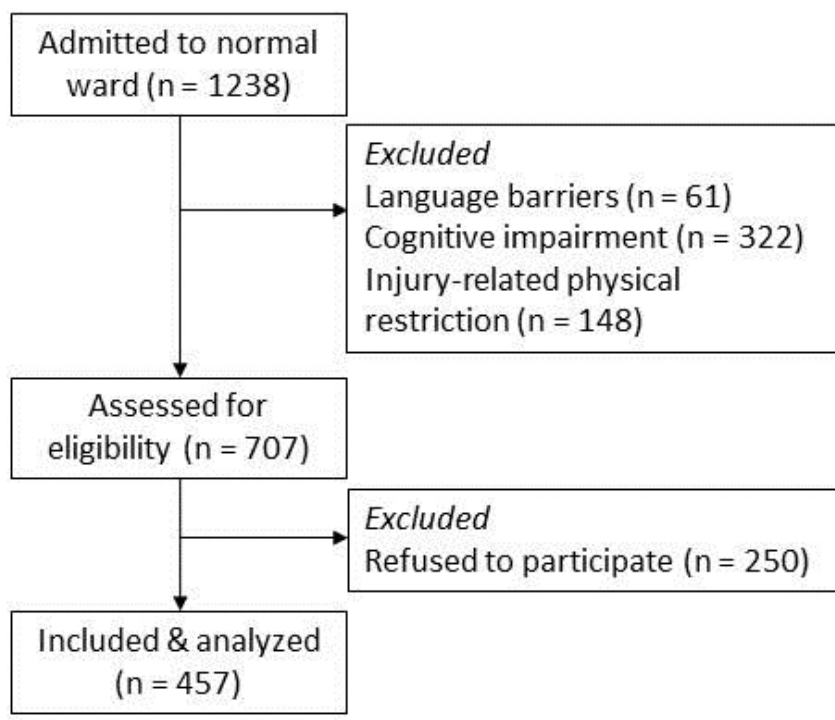
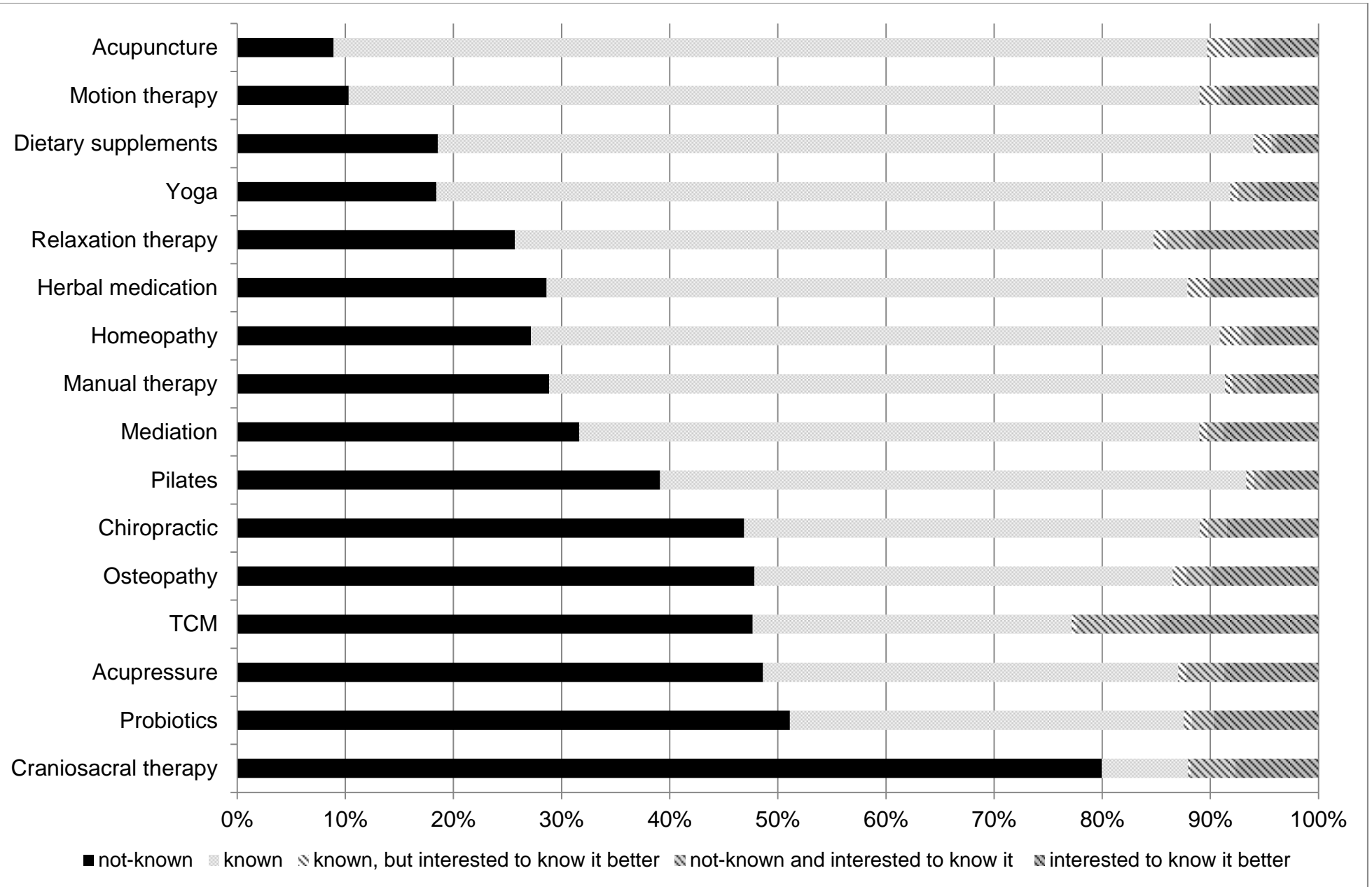
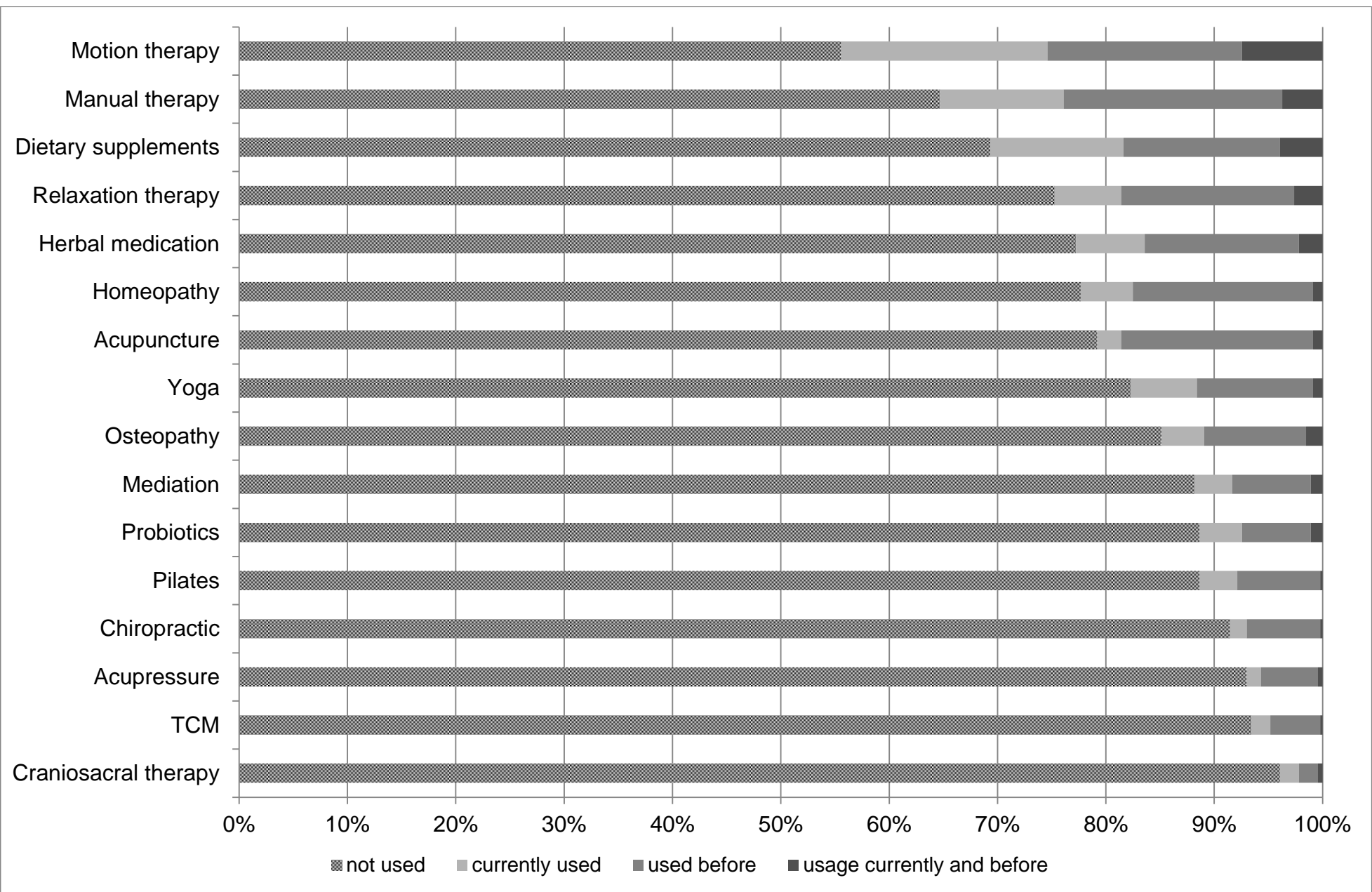


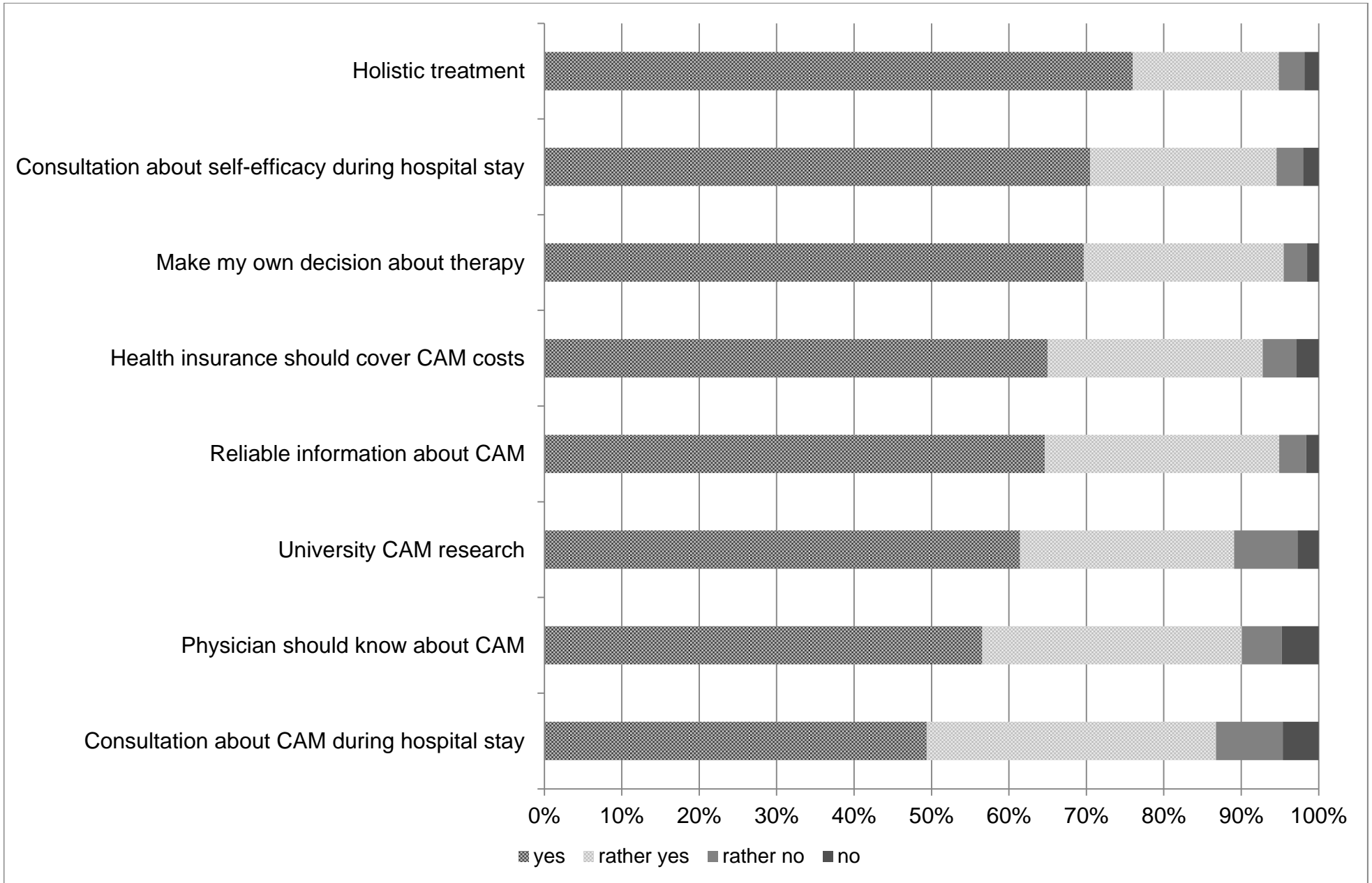
Figure 1: Process of screening, including and analysis of participants

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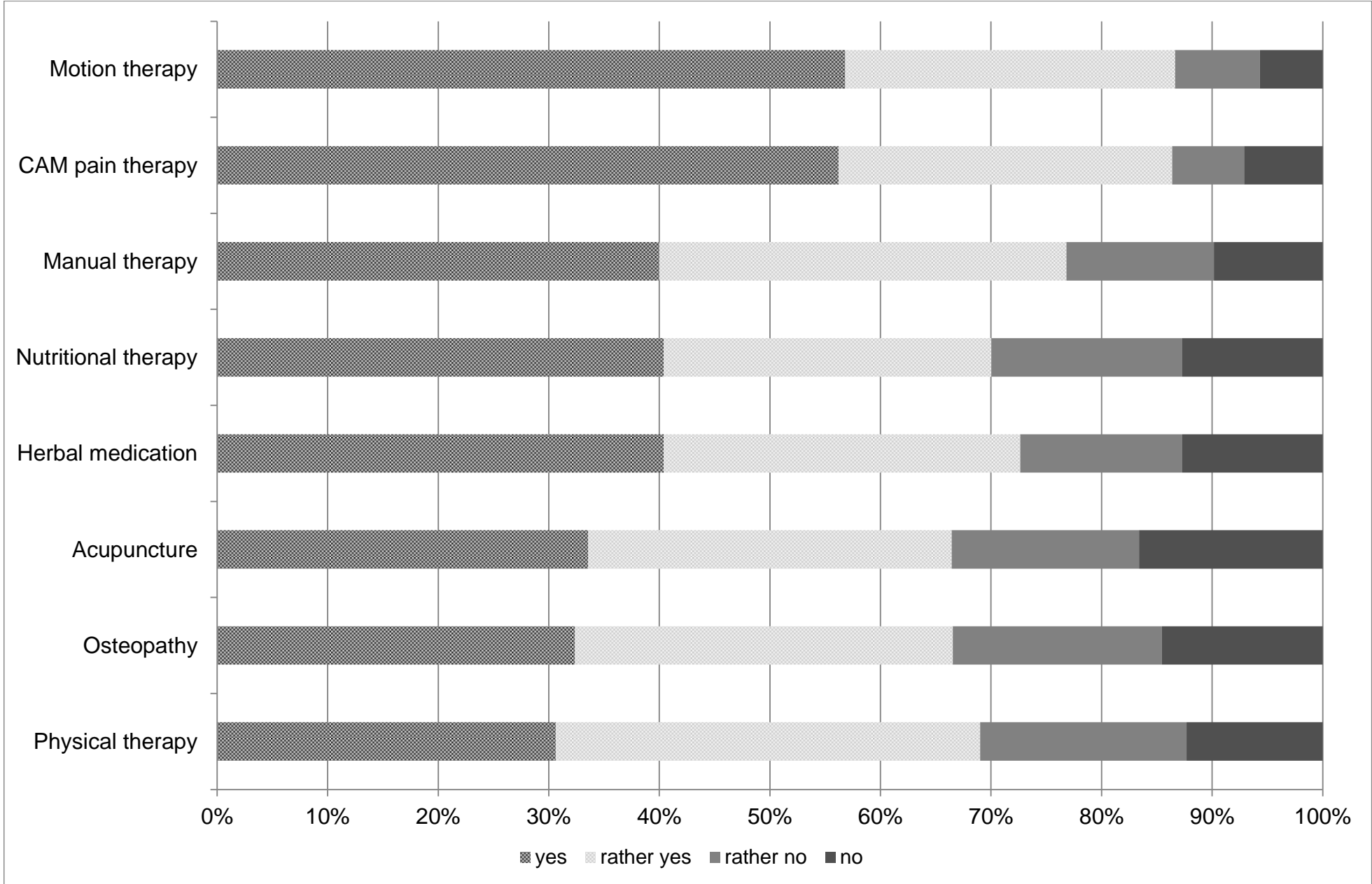


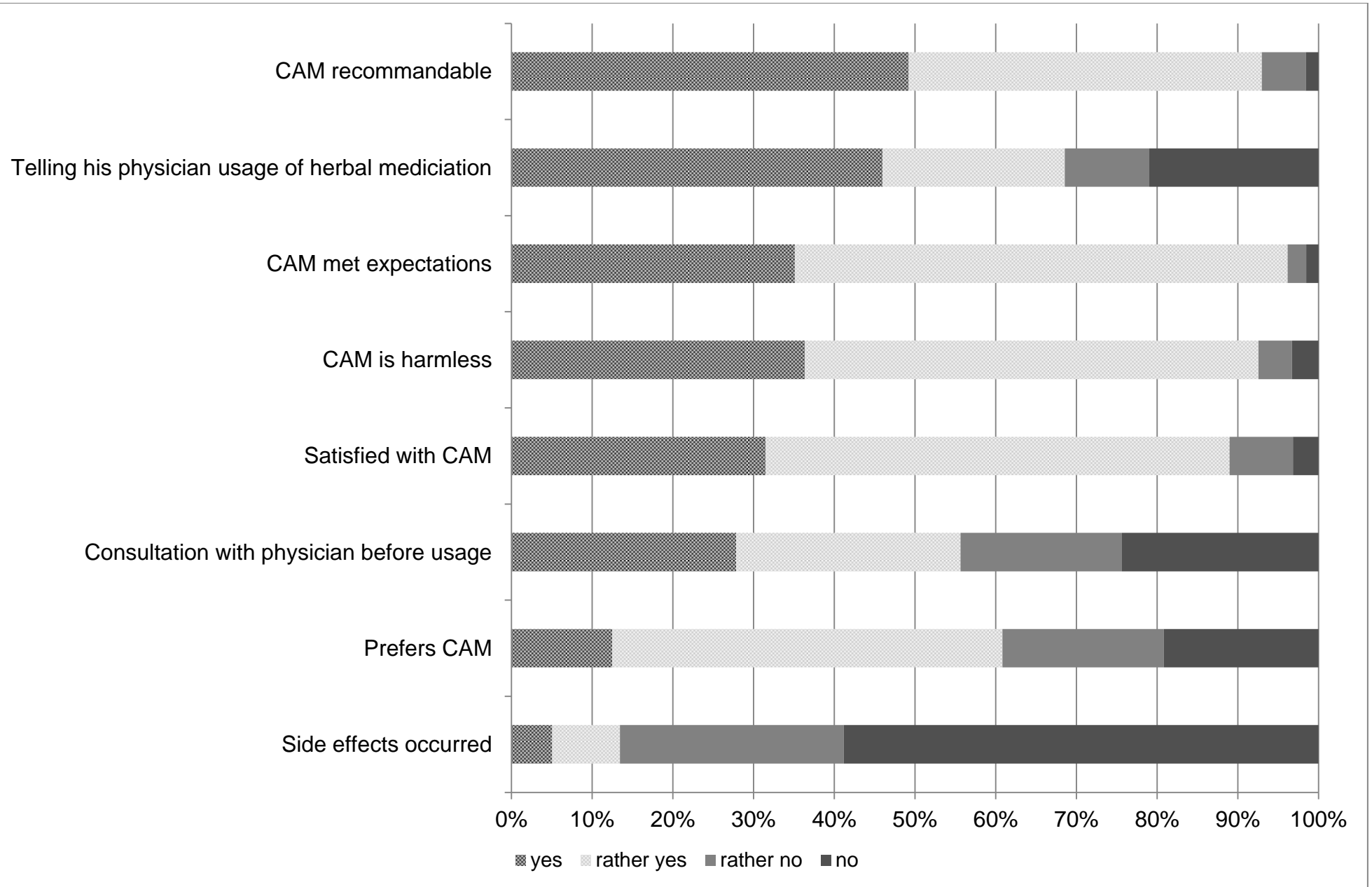


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## STROBE Statement—checklist of items that should be included in reports of observational studies

	Item No	Recommendation	Page
<b>Title and abstract</b>	1	✓ (a) Indicate the study's design with a commonly used term in the title or the abstract	1
		✓ (b) Provide in the abstract an informative and balanced summary of what was done and what was found	2
<b>Introduction</b>			
Background/rationale	2	✓ Explain the scientific background and rationale for the investigation being reported	4
Objectives	3	✓ State specific objectives, including any prespecified hypotheses	4
<b>Methods</b>			
Study design	4	✓ Present key elements of study design early in the paper	4
Setting	5	✓ Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	4
Participants	6	<del>(a) Cohort study—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up</del>	
		<del>Case-control study—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls</del>	
		✓ Cross-sectional study—Give the eligibility criteria, and the sources and methods of selection of participants	4
		<del>(b) Cohort study—For matched studies, give matching criteria and number of exposed and unexposed</del>	
		<del>Case-control study—For matched studies, give matching criteria and the number of controls per case</del>	
Variables	7	✓ Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. <del>Give diagnostic criteria, if applicable</del>	
Data sources/ measurement	8*	✓ For each variable of interest, give sources of data and details of methods of assessment (measurement). <del>Describe comparability of assessment methods if there is more than one group</del>	5
Bias	9	✓ Describe any efforts to address potential sources of bias	4-5
Study size	10	✓ Explain how the study size was arrived at	5
Quantitative variables	11	✓ Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	5
Statistical methods	12	✓ (a) Describe all statistical methods, including those used to control for confounding	5
		✓ (b) Describe any methods used to examine subgroups and interactions	5
		✓ (c) Explain how missing data were addressed	
		<del>(d) Cohort study—If applicable, explain how loss to follow-up was addressed</del>	
		<del>Case-control study—If applicable, explain how matching of cases and controls was addressed</del>	
		✓ Cross-sectional study—If applicable, describe analytical methods taking account of sampling strategy	5
		<del>(e) Describe any sensitivity analyses</del>	

Continued on next page



<b>Results</b>			
Participants	13*	✓(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed ✓(b) Give reasons for non-participation at each stage ✓(c) Consider use of a flow diagram	6 6 Figure 1
Descriptive data	14*	✓(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders ✓(b) Indicate number of participants with missing data for each variable of interest (c) <del>Cohort study—Summarise follow-up time (eg, average and total amount)</del>	6 6
Outcome data	15*	<del>Cohort study—Report numbers of outcome events or summary measures over time</del> <del>Case-control study—Report numbers in each exposure category, or summary measures of exposure</del> ✓Cross-sectional study—Report numbers of outcome events or summary measures	6-9
Main results	16	✓(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included ✓(b) Report category boundaries when continuous variables were categorized (c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	6-9 6-9
Other analyses	17	✓ Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	9-10
<b>Discussion</b>			
Key results	18	✓ Summarise key results with reference to study objectives	10
Limitations	19	✓ Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	10-11
Interpretation	20	✓ Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	11-12
Generalisability	21	✓ Discuss the generalisability (external validity) of the study results	10-12
<b>Other information</b>			
Funding	22	✓ Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	12

\*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

**Note:** An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at [www.strobe-statement.org](http://www.strobe-statement.org).