

1 **Treating insomnia in Swiss primary care practices: a survey study**
2 **based on case vignettes**

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4 Stefanie Linder¹, Simone B. Duss², Charles Dvořák³, Christoph Merlo^{3,4}, Stefan Essig^{3,4}, Kali Tal¹, Cinzia Del
5 Giovane¹, Lamprini Syrogiannouli¹, Raphael Heinzer⁵, Christoph Nissen⁶, Claudio L. A. Bassetti², Reto Auer^{1,7},
6 Micheline Maire¹

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8 ¹ Institute of Primary Health Care (BIHAM), University of Bern, Switzerland.

9 ² Sleep-Wake-Epilepsy Center, Department of Neurology, University Hospital (Inselspital) and University of Bern, Bern, Switzerland.

10 ³ Sentinella - Swiss Epidemiological System - Federal Office of Public Health FOPH, Bern, Switzerland.

11 ⁴ Institute of Primary and Community Care, Lucerne, Switzerland.

12 ⁵ Center for Investigation and Research in Sleep, Pulmonary Department, University Hospital of Lausanne, Lausanne, Switzerland.

13 ⁶ University Hospital of Psychiatry and Psychotherapy, Bern, Switzerland.

14 ⁷ Center for Primary Care and Public Health (Unisanté), University of Lausanne, Lausanne, Switzerland.

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16 **Correspondence:**

17 Micheline Maire, PhD

18 Institute of primary health care (BIHAM), University of Bern

19 Mittelstrasse 43

20 CH - 3012 Bern

21 micheline.maire@biham.unibe.ch

22 +41 31 631 58 66

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5 **Author contribution:** MM, RA and SL have contributed to the study concept, developed the survey,
6 and acquired, analyzed and interpreted data; they also drafted and revised the manuscript. CN, SD, RH
7 and CB helped develop the case vignettes and revised the manuscript. CDG and LS analyzed and
8 interpreted data. CD, CM and SE helped revise the survey and the manuscript. KT helped draft and
9 revise the manuscript.

1 **Summary**

2 Guidelines recommend cognitive behavioral therapy for insomnia (CBT-I) as first-line treatment for
3 chronic insomnia, but it is not clear how many primary care physicians (PCPs) in Switzerland
4 prescribe this treatment. We created a survey that asked PCPs how they would treat chronic insomnia
5 and how much they knew about CBT-I. The survey included two case vignettes that described patients
6 with chronic insomnia, one with and one without comorbid depression. PCPs also answered general
7 questions about treating chronic insomnia and about CBT-I and CBT-I providers. Of the 820 Swiss
8 PCPs we invited, 395 (48%) completed the survey (mean age 54; 70% male); 87% of PCPs prescribed
9 sleep hygiene and 65% phytopharmaceuticals for the patient who had only chronic insomnia; 95%
10 prescribed antidepressants for the patient who had comorbid depression. In each case, 20% of PCPs
11 prescribed benzodiazepines or benzodiazepine receptor agonists, 8% prescribed CBT-I, 68% said they
12 knew little about CBT-I, and 78% did not know a CBT-I provider. In the clinical case vignettes, most
13 PCPs treated chronic insomnia with phytopharmaceuticals and sleep hygiene despite their lack of
14 efficacy, but PCPs rarely prescribed CBT-I, felt they knew little about it, and usually knew no CBT-I
15 providers. PCPs need more information about the benefits of CBT-I and local CBT-I providers and
16 dedicated initiatives to implement CBT-I in order to reduce the number of patients who are prescribed
17 ineffective and potentially harmful medications.

18 **Keywords:** chronic insomnia, treatment, primary care, cognitive behavioral therapy for chronic
19 insomnia

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1 Introduction

2 Chronic insomnia is common in industrialized countries; prevalence averages about 10%, though the
3 number of affected people ranges from 6% to 19% in European countries (Calem et al., 2012; Leger,
4 Guilleminault, Dreyfus, Delahaye, & Paillard, 2000; Marschall, Hildebrandt, Sydow, & Nolting,
5 2017). DSM-5 defines chronic insomnia as subjective sleep disturbance at least 3 nights/week for at
6 least 3 months, with concomitant daytime impairment (Association, 2013).
7 Chronic insomnia lowers patient quality of life and poses a significant burden on the health care
8 system (Delini-Stula, Bischof, & Holsboer-Trachsler, 2007; Novak, Mucsi, Shapiro, Rethelyi, &
9 Kopp, 2004). It is also associated with medical and psychiatric conditions like cardiovascular disease
10 and depression (Baglioni, Spiegelhalder, Nissen, & Riemann, 2011; Li, Zhang, Hou, & Tang, 2014).
11 Chronic insomnia and depression are closely linked: depressed patients usually have altered sleep and
12 chronic insomnia patients have twice the risk of developing depression (Baglioni et al., 2011;
13 Riemann, Krone, Wulff, & Nissen, 2020). The conditions share characteristics like hyperarousal, but
14 each can arise and persist independently (Baglioni et al., 2011). Researchers once considered insomnia
15 a symptom or consequence of depression, but more recent studies suggest it be treated separately
16 (Baglioni et al., 2011). The DSM-5 now defines chronic insomnia independently from associated
17 conditions and no longer distinguishes primary and secondary insomnia (Association, 2013).
18 However, primary care physicians' (PCPs) practice has been slower to change (Sivertsen, Nordhus,
19 Bjorvatn, & Pallesen, 2010).

20 European Sleep Research Society's (ESRS) guidelines for treating chronic insomnia
21 recommend first-line treatment with cognitive behavioral therapy for insomnia (CBT-I) (Riemann et
22 al., 2017), which usually combines psychoeducation/sleep hygiene, relaxation training, stimulus
23 control, sleep restriction, and cognitive therapy (Riemann & Perlis, 2009). Sleep restriction has been
24 found effective also when used alone (Krieger et al., 2019; Miller et al., 2014). If patients cannot
25 access CBT-I, or if they have tried it and it hasn't worked, the next step is short term (≤ 4 weeks)
26 pharmacotherapy treatment with fast-acting benzodiazepines (BZD; e.g. triazolam), benzodiazepine
27 receptor agonists (BZRA; e.g., zolpidem), and certain sedative antidepressants (e.g., trazodone)
28 (Riemann et al., 2017). Guidelines do not recommend phytopharmaceuticals (e.g., valerian),
29 complementary or alternative treatments (e.g., homeopathy) (Riemann et al., 2017). When patients
30 have insomnia and depression, the American Academy of Sleep Medicine (AASM) recommends
31 treating insomnia as stated above and separately prescribing antidepressants or psychotherapy for
32 separately (Schutte-Rodin, Broch, Buysse, Dorsey, & Sateia, 2008).

33 Recent studies revealed that PCPs commonly treat insomnia with sleep hygiene alone,
34 pharmacotherapy alone, or both (Bjorvatn, Meland, Flo, & Mildestvedt, 2017; Conroy & Ebben, 2015;
35 Everitt et al., 2014; Sivertsen et al., 2010). Sleep hygiene is often the first treatment (Bjorvatn, Fiske,
36 & Pallesen, 2011; Everitt et al., 2014; Sivertsen et al., 2010) though it is less effective than CBT-I
37 (Pigeon, Funderburk, Bishop, & Crean, 2017). When patients do not respond, then many PCPs

1 prescribe medication (Everitt et al., 2014), most commonly benzodiazepines, antidepressants
2 (Bjorvatn et al., 2017; Everitt et al., 2014; Maire et al., 2020; Marschall et al., 2017; Sivertsen et al.,
3 2010), and phytopharmaceuticals (Everitt et al., 2014; Lai, Tan, & Lai, 2011; Sanchez-Ortuno,
4 Belanger, Ivers, LeBlanc, & Morin, 2009).

5 The gap between insomnia treatment guidelines and PCPs practice in Europe is troubling and
6 we aimed to investigate whether the trend was similar in Switzerland. We hypothesized that Swiss
7 PCPs would often treat chronic insomnia with medication, that most know little about CBT-I, and that
8 they rarely know specialists who provide CBT-I. We thus created a survey featuring two case
9 vignettes (chronic insomnia and chronic insomnia with comorbid depression) to explore PCPs' usual
10 treatment approach and included questions about their knowledge of CBT-I and CBT-I providers.

11

1 **Methods**

2 **Participants**

3 We invited all Swiss PCPs working as medical student preceptors for the Institute of Primary Care at
4 the University of Bern (BIHAM) and all PCPs who report for the Sentinella practice-based research
5 network (PBRN)¹ led by the Federal Office of Public Health (BAG) to participate in a survey. PCPs
6 who belonged to both groups were asked to complete only one survey. The participation in the survey
7 was voluntary and the data was collected anonymously. PCPs were excluded from the survey if they
8 worked only as PCP pediatricians.

9 **Survey development and structure**

10 Our survey comprised three parts. Part 1 collected demographic data about the PCPs: sex; age; years
11 of work experience (divided into age groups, e.g., 5-10 years, 11-15 years); practice site (urban,
12 intermediate, rural); and, medical qualifications related to sleep medicine (pneumology, psychiatry,
13 neurology, psychosomatic and psychosocial medicine). Part 2 consisted of two case vignettes, one
14 presenting a case of chronic insomnia without any comorbidity, the other a case of co-occurring
15 chronic insomnia and major depression. PCPs were asked to decide on the treatment approach they
16 would take in each case. Options were divided in pharmacological, non-pharmacological, and
17 complementary-alternative treatment. Each answer block contained a selection of common treatment
18 approaches (see Supplementary Table 1) and a free text field to capture methods not listed. PCPs
19 could choose more than one answer. Part 3 requested PCPs to rate on 5-point Likert scales their
20 knowledge of CBT-I, their interest in learning more about pharmacological and non-pharmacological
21 treatments for chronic insomnia, and asked to indicate if they knew of a nearby professional who
22 offered CBT-I. PCPs were also asked how often they feel their chronic insomnia patients expect them
23 to prescribe a hypnotic. Several professionals in sleep medicine, psychiatry and general medicine
24 reviewed the survey before we distributed it. We developed the online survey with Ilias, a content
25 development tool for educators provided by the University of Bern, Switzerland. We provided the
26 survey in either German or French and piloted it with five PCPs, whose feedback we used to improve
27 it. Anonymized surveys fall outside the Swiss Human Research Act, so our study did not need to be
28 approved by an ethics committee.

29 **Procedures**

30 The PCPs who worked as medical student preceptors received the link to the survey in an electronic
31 newsletter, via email. We sent two email reminders to non-responders in this group and mailed them a
32 paper-pencil version of the survey if they failed to respond. The PCPs involved in the Sentinella
33 project took part in a parallel data collection on chronic insomnia prevalence and were mailed the
34 paper-pencil version by post. Sentinella non-responders were mailed one written reminder. Data was
35 collected from May to September 2018.

¹ A network initially designed to collect data on communicable diseases such as influenza

1 **Statistical analysis**

2 To describe baseline characteristics, we reported continuous variable data in means and standard
3 errors (SE), and categorical variable data in percentages. To assess the treatment PCPs initiated in the
4 case vignettes, we calculated the proportions of PCPs who chose each treatment option. To compare
5 the treatment chosen in the two case vignettes, we used Fisher’s exact test. After Bonferroni-
6 correction for multiple comparison, we considered a p-value of 0.0024 to be statistically significant.
7 To investigate the association between PCPs demographics and knowledge about CBT-I, we fitted
8 multivariate logistic regression models with CBT-I knowledge and CBT-I provider knowledge as
9 outcomes, and PCPs sex, age, practice site, years of experience, and further qualification as covariates.
10 To investigate the association between PCPs characteristics and their treatment approach in the case
11 vignettes, we fitted a multivariate logistic regression model with treatment as outcome and PCPs sex,
12 age, practice site, years of experience, further qualification, CBT-I knowledge, and CBT-I provider
13 knowledge as covariates. A p-value of < 0.05 was considered statistically significant. We analyzed
14 available data and did not use statistical procedures to impute missing data because there were few
15 missing values in the final data set (see Supplementary Table 2). When PCPs did not answer the
16 treatment question at all, we marked the answer as missing. STATA 15.1 was used for all analyses
17 (StataCorp, College Station, TX, USA).

18

1 Results

2 Demographics

3 A total of 820 PCPs were invited: 693 worked as medical student preceptors, 132 were PCPs in the
4 Sentinella research network. Five PCPs belonged to both groups. Survey response rate was 48%
5 (n=395/820) for all groups: 70% (n=93/132) in the Sentinella group and 44% (n=302/688) in the
6 student preceptor group (41% online, 59% per post). We excluded 34 surveys; 18 PCPs were only
7 working as pediatricians and 16 PCPs didn't finish the survey. In the end, we analyzed 361 surveys;
8 70% (n=252/358) the respondents were men, 90% (n=323/361) were German speaking; mean age was
9 54 years. Nearly half (43%, n=154/360) had been practicing over 20 years. Practice locations were
10 evenly distributed across urban, intermediate, and rural. (See Table 1 for a detailed description of
11 participants.)

12

13 **Table 1** Demographic and occupational characteristics of respondents.

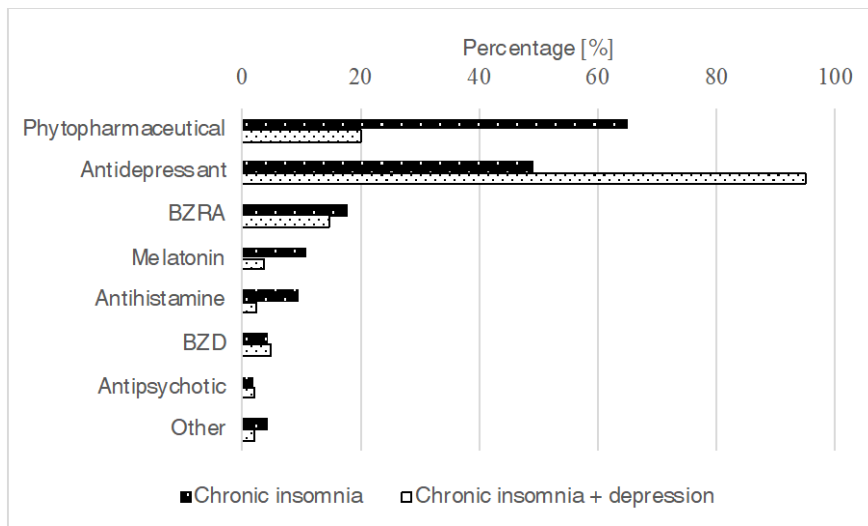
Characteristics (N = 361)*	N or mean	% or SE
Sex		
Female	106	29.4%
Male	252	69.8%
Mean Age	54.3	0.5
Language		
German	323	89.5%
French	38	10.5%
Experience as PCP		
< 5 years	31	8.6%
5 - 10 years	58	16.1%
11 - 15 years	65	18.0%
16 - 20 years	52	14.4%
> 20 years	154	42.7%
Practice location		
Urban	119	33.0%
Intermediate	99	27.4%
Rural	143	39.6%
Further qualification		
Pneumology	2	0.6%
PPM	33	9.1%
None	326	90.3%

**Incomplete demographic data in 4 participants
PCP = primary care physician, PPM:
psychosomatic and psychosocial medicine, SE:
standard error*

14

15 Case Vignettes

16 Almost all PCPs initiated both pharmacological and non-pharmacological treatment in both cases.
17 Figures 1, 2 and 3 provide an overview of the pharmacological, non-pharmacological and
18 complementary-alternative treatments PCPs initiated in the case vignettes.

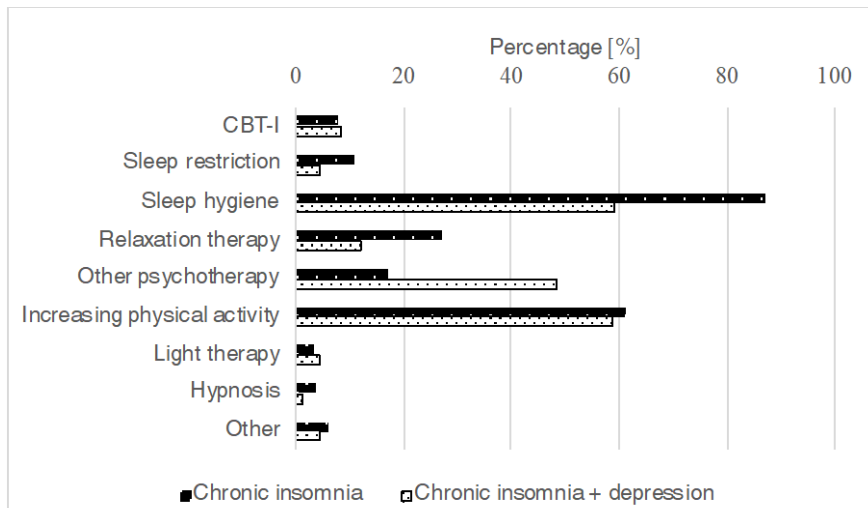


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2 **Fig. 1** Pharmacological treatment initiated by primary care physicians regarding two cases of
 3 insomnia.

4 BZD = benzodiazepine, BZRA = benzodiazepine receptor agonist.

5

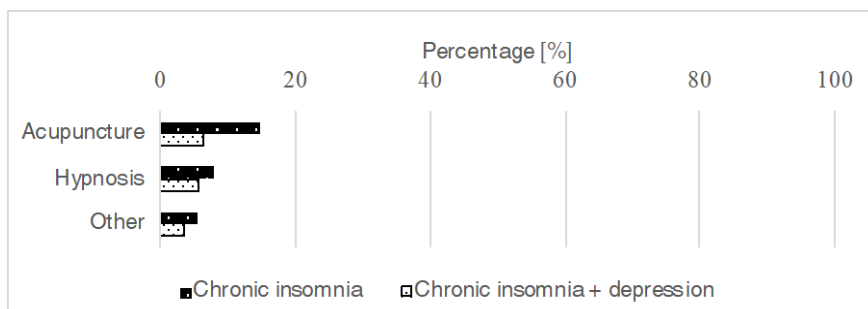


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7 **Fig. 2** Non-pharmacological treatment initiated by primary care physicians regarding two cases of
 8 insomnia.

9 CBT-I = cognitive behavioral therapy for insomnia.

10



11

12 **Fig. 3** Complementary-alternative treatment initiated by primary care physicians regarding two cases
 13 of insomnia.

14

1 **Case 1: chronic insomnia without comorbidity**

2 Two-thirds of all PCPs (65%, n=235/361) prescribed phytopharmaceuticals and half prescribed
3 antidepressants (49%, n=177/361), a fifth prescribed BZRA (18%, n=64/361), and 4% (n=15/361)
4 prescribed BZD. The most commonly initiated non-pharmacological treatments were sleep hygiene
5 (87%, n=314/361) and physical activity advice (61%, n=221/361). A third of PCPs prescribed
6 relaxation therapy (27%, n=98/361). Few PCPs prescribed psychotherapy (17%, n=61/361). Even
7 fewer prescribed sleep restriction (11%, n=39/361), or CBT-I (8%, n=28/361); 2% (n=9/361)
8 prescribed all three components of CBT-I (i.e. sleep hygiene, relaxation therapy, sleep restriction), but
9 did not explicitly prescribe CBT-I. Almost a quarter (23%, n=82/361) of PCPs initiated a
10 complementary-alternative treatment, usually acupuncture (15%, n=53/361) or homeopathy (8%,
11 n=29/361). In multivariate adjusted models, male PCPs were less likely to prescribe
12 phytopharmaceuticals (OR 0.36, p<0.001; 95% CI 0.20 – 0.64), sleep hygiene (OR 0.4, p=0.045; 95%
13 CI 0.16 – 0.98), and relaxation therapy (OR 0.42, p<0.001; 95% CI 0.25 – 0.72). French-speaking
14 PCPs prescribed significantly fewer antidepressants (OR 0.11, p<0.001; 95% CI 0.04 – 0.32).

15 **Case 2: chronic insomnia and depression**

16 Most PCPs prescribed antidepressants (95%, n=343/361). About one-fifth prescribed
17 phytopharmaceuticals (20%, n=72/361) and BZRA (15%, n=53/361). BZD were prescribed by 5%
18 (n=18/361) of PCPs. The most commonly initiated non-pharmacological treatments were sleep
19 hygiene (59%, n=213/361), physical activity advice (59%, n=212/361) and psychotherapy (48%,
20 n=174/361). Relaxation therapy was prescribed by 12% (n=43/361). Few prescribed CBT-I (9%,
21 n=31/361) and sleep restriction (4%, n=16/360). One in 10 PCPs prescribed complementary-
22 alternative treatments (12%, n=43/361), usually acupuncture (6%, n=23/361) and homeopathy (6%,
23 n=20/361).
24 French-speaking PCPs (OR 0.18, p=0.003; 95% CI 0.06 – 0.56) prescribed significantly less
25 antidepressants and were more likely to give sleep hygiene advice (OR 3.13, p=0.01; 95% CI 1.31 –
26 7.52).

27

28

1 **Table 2** Covariates associated with the initiated treatment by primary care physicians in a case of
 2 insomnia and a case of insomnia comorbid with depression.*

A) Case 1: Insomnia - Treatment			
	OR	95% CI	p-value
Antidepressants			
French-speaking PCP	0.11	0.04-0.32	<0.001
Phytopharmaceuticals			
Male PCP	0.36	0.20-0.64	<0.001
Sleep hygiene			
Male PCP	0.4	0.16-0.98	0.045
Relaxation therapy			
Male PCP	0.42	0.25-0.72	0.001
CBT-I			
CBT-I knowledge	2.59	1.61-4.15	<0.001
CBT-I provider knowledge	6.55	2.92-14.67	<0.001
B) Case 2: Insomnia + Depression - Treatment			
	OR	95% CI	p-value
Antidepressants			
French-speaking PCP	0.18	0.06-0.56	0.003
Sleep hygiene			
French-speaking PCP	3.13	1.31-7.52	0.01
CBT-I			
CBT-I knowledge	2.69	1.7-4.24	<0.001
CBT-I provider knowledge	6.44	2.95-14.05	<0.001

3 *A complete list of treatment options is available online (Supplementary Table 1)*
 4 *CBT-I = cognitive behavioral therapy for insomnia, PCP = primary care physician.*
 5 ** Covariates used for multivariate adjustment: sex, mean age, language, experience as PCP, practice location, further*
 6 *qualification, knowledge about CBT-I and CBT-I providers. Only treatment options with significantly associated covariates*
 7 *are presented.*

8
 9 **Comparing treatment modalities of PCPs between case 1 and 2**

10 When both insomnia and depression were present, PCPs were significantly more likely to prescribe
 11 antidepressants (95% vs. 49%) and psychotherapy (48% vs. 17%). Phytopharmaceuticals were
 12 prescribed three times less in this case (20% vs. 65%; all Fisher's exact=0.000).
 13 CBT-I was provided at the same low rate in both case vignettes (9% and 8%); CBT-I components like
 14 sleep hygiene (59% vs. 87%; Fisher's exact<0.0001), relaxation therapy (12% vs. 27%; Fisher's
 15 exact<0.0001) and sleep restriction (4% vs. 11%; Fisher's exact=0.001), were prescribed less often
 16 when both insomnia and depression were present. Half as many PCPs initiated a complementary-
 17 alternative treatment (12% vs. 23%; Fisher's exact<0.0001) when both conditions were present. The
 18 prescription rate of physical activity advice (59% and 61%) and hypnotics (20% and 22%) were
 19 similar in each case.

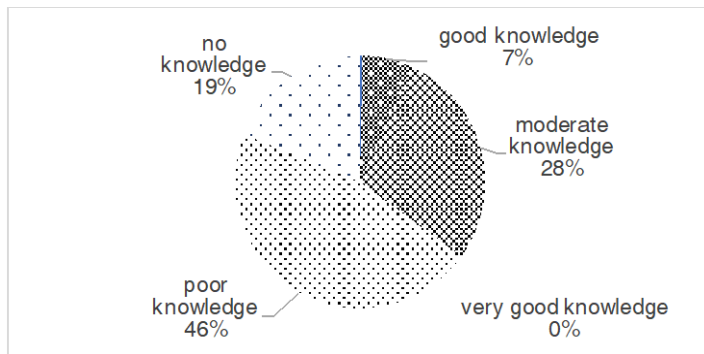
20 **Perception of chronic insomnia treatment**

21 About two-thirds of PCPs answered that they knew nothing (19%, n=68/360) or very little (46%,
 22 n=166/360) about CBT-I (Figure 4). About a fifth of PCPs (22%, n=80/358) did know of a local
 23 specialist who provided CBT-I (Figure 5). None of the characteristics we evaluated predicted the level
 24 of knowledge PCPs had about either CBT-I or CBT-I providers. We found that about two thirds of
 25 PCPs prescribing CBT-I had at least moderate knowledge about CBT-I (case 1: n=18/28, case 2:

1 n=22/31); roughly 60% of PCPs who prescribed CBT-I in the case vignettes knew a provider (case 1:
2 n=17/28, case 2: n=18/31).

3 Over three-quarters of participants said they had great or very great interest in learning more about
4 pharmacological (76%, n=274/360) and non-pharmacological (78%, n=281/361) treatments for
5 chronic insomnia. About half of PCPs (54%, n=195/361) reported they frequently felt patients with
6 chronic insomnia expected them to prescribe a hypnotic.

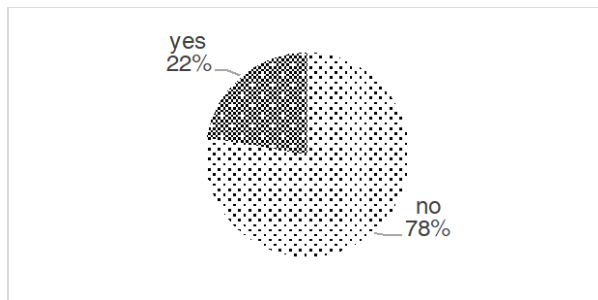
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9 **Fig. 4** Primary care physicians' self-assessed knowledge about cognitive behavioral therapy for
10 insomnia.

11



12

13 **Fig. 5** Primary care physicians' knowledge of a specialist in their surroundings offering cognitive
14 behavioral therapy for insomnia.

1 **Discussion**

2 PCPs in Switzerland rarely followed evidence-based guidelines when treating chronic insomnia.
3 Instead of CBT-I, they usually prescribed sleep hygiene (87%), more physical activity (61%),
4 phytopharmaceuticals (65%), and antidepressants (49%) in a clinical vignette presenting a patient with
5 insomnia without depression. A fifth of PCPs prescribed BZRA (18%) or BZD (4%). Only 8% of
6 PCPs initiated CBT-I, the first-line recommended treatment according to guidelines. In presence of a
7 comorbid depression, PCPs were more likely to treat with antidepressants (95%) and psychotherapy
8 (48%) and less likely to prescribe phytopharmaceuticals (20%), sleep hygiene (59%), or other
9 components of CBT-I. Half of all PCPs reported expectations of patients to prescribe them hypnotics
10 (54%). Most were unfamiliar with CBT-I (65%); only a fifth knew a local CBT-I provider (22%).
11 Most PCPs expressed strong interest in learning more about how to treat chronic insomnia (77%).
12 These findings confirmed our hypothesis that Swiss PCPs, like those in other European countries,
13 rarely followed the guidelines that recommend CBT-I as a first line treatment for insomnia (Riemann
14 et al., 2017).

15 Koffel et al. found that, on the system level, PCPs and patients may not have access to CBT-I
16 providers, which are mainly, psychiatrists, clinical psychologists and sleep centers (Koffel,
17 Bramoweth, & Ulmer, 2018). There are effective online versions of CBT-I, which could reduce this
18 bottleneck if PCPs were aware of them (Krieger et al., 2019; Seyffert et al., 2016). At the clinical
19 level, Koffel et al. identified four barriers to CBT-I utilization: 1) widespread ignorance of CBT-I,
20 which accords with our findings that only 8% of PCPs prescribed CBT-I; 2) the tendency of PCPs to
21 regard chronic insomnia as a secondary condition that would resolve if the condition they thought
22 primary was treated (Sake, Wong, Bartlett, & Saini, 2017; Ulmer et al., 2017), which accords with our
23 finding that PCPs tended to treat comorbid insomnia based on depression guidelines (Kupfer, Frank,
24 & Phillips, 2012); 3) PCPs think patients prefer medication (Cheung et al., 2014), and our findings
25 support this since half of our study PCPs felt pressure to prescribe hypnotics. However, non-
26 pharmacological treatment was prescribed more often than pharmacological treatment; 4) clinicians
27 may lack of motivation, time and resources to manage insomnia (Koffel et al., 2018). Our inquiries did
28 not cover this aspect, but our data suggest that most PCPs are very interested in learning more about
29 treating insomnia, and might even be willing to implement CBT-I themselves.

30 Sleep hygiene was the most common component of CBT-I prescribed though it is not
31 recommended as a sole treatment for chronic insomnia (Riemann et al., 2017) and may increase drug
32 use (Bjorvatn et al., 2011); 10% of PCPs prescribed sleep restriction (the most effective single
33 component of CBT-I) (Krieger et al., 2019), and a third prescribed relaxation therapy; 2% prescribed
34 all three components of CBT-I, but did not explicitly prescribe CBT-I. Common use of CBT-I
35 components indicates that PCPs were willing to treat patients with non-pharmacological options,
36 indicating they may be receptive to prescribing CBT-I.

1 Phytopharmaceuticals were the most frequently prescribed medications in our study, though
2 evidence of beneficial effects is lacking and guidelines do not recommend them (Riemann et al.,
3 2017). Young women and well-educated patients are most likely to take phytopharmaceuticals to
4 improve sleep and may prefer them because they are unaware of the lack of efficacy, drug interactions
5 and side effects (Sanchez-Ortuno et al., 2009). Both patients and PCPs may be encouraged to
6 prescribe phytopharmaceuticals because direct-to-consumer advertising suggests they are purely
7 beneficial (Brody & Light, 2011). In another study, we found a lower rate of phytopharmaceutical and
8 high rate of BZD use in Swiss primary care chronic insomnia patients (Maire et al., 2020). One
9 hypothesis might be that PCPs initially prescribed phytopharmaceuticals and then, because patients do
10 not respond to this ineffective treatment, felt entitled to switch patients to the more effective
11 hypnotics, even though that meant potential long-term treatment and addiction (Schonmann et al.,
12 2018).

13 The high prescription rate of antidepressants in our study supports data on chronic insomnia
14 patients (Lai et al., 2011; Maire et al., 2020). PCPs may believe antidepressants are the most effective
15 long-term treatment for chronic insomnia (Sivertsen et al., 2010), that they are safer and less addictive
16 than hypnotics (Everitt et al., 2014), or that chronic insomnia is a secondary condition of depression
17 (Sivertsen et al., 2010). They may find antidepressant treatment improves chronic insomnia symptoms
18 when depression is present and conclude it effectively treats chronic insomnia alone (Lai et al., 2011;
19 Sivertsen et al., 2010).

20 Our PCPs said they would prescribe hypnotics – BZD and BZRA– at a lower rate than PCPs
21 in other countries (Sivertsen et al., 2010). Parallel data collection in Swiss primary care practices
22 revealed that half of chronic insomnia patients in Swiss primary care still use BZD or BZRA for sleep
23 problems (Maire et al., 2020), perhaps because patients are already dependent on them or pressure
24 PCPs to prescribe (Everitt et al., 2014).

25 In cases of chronic insomnia with depression, PCPs tended to treat depression with
26 antidepressants and psychotherapy rather than CBT-I or its components, suggesting they believe
27 insomnia is a symptom resulting of depression. When PCPs recognize insomnia as an independent
28 condition, patients are less likely to develop chronic insomnia and depression; chronic insomnia
29 doubles a patient’s risk of developing depression (Baglioni et al., 2011; Riemann et al., 2020).

30 The study has four limitations. PCPs self-reported treatment based on fictive case vignettes
31 and not on actual patient data by chart review, for example. PCPs read a short introductory text to the
32 questionnaire. No further instruction on filling out the survey was provided. Second, specifying and
33 categorizing treatment options on the survey form may have biased PCP responses by presenting them
34 with plausible treatment options they might not otherwise have considered; it is also possible our
35 categorizations could have influenced their treatment choice. Third, PCPs who train students or who
36 take part in the Sentinella project may know more about insomnia treatment than the average PCP.
37 PCPs may tend to overestimate their knowledge about CBT-I because it is socially desirable to be

1 more informed. As a result, we might have overestimated how much PCPs knew about CBT-I, but this
2 bias would only strengthen our main finding that CBT-I appears vastly under-prescribed and that
3 physicians reported knowing little about it. Fourth, our sample size was too small to use a logistic
4 regression model to test if CBT-I knowledge or CBT-I provider knowledge was associated with CBT-I
5 prescription (n=28 prescribing CBT-I in case 1 and n=31 in case 2), so we limited our analyses to
6 descriptive statistics.

7 The response rate in the Sentinella group (70%) was substantially higher than in the student
8 preceptor group (44%). Since the Sentinella PCPs are specifically recruited to participate in data
9 collection and receive a yearly reimbursement for their overall participation, this could explain the
10 much higher response rate in this group. Student preceptor PCPs also seemed to favor the paper-pencil
11 version of the survey over the online version.

12 PCPs knew little about CBT-I, were not connected to CBT-I providers, often prescribe
13 medication as a first-line treatment, and may still hold the outdated notion that chronic insomnia is a
14 secondary condition of depression. However, non-pharmacological therapies were frequently chosen
15 to treat both insomnia and insomnia comorbid with depression, showing that these therapy options are
16 generally well accepted by PCPs. Since PCPs expressed strong interest in learning more about
17 treatment options for chronic insomnia and may be familiar with some CBT-I components, researchers
18 should identify specific barriers to CBT-I implementation in clinical practice, devise and test
19 interventions that educate PCPs about chronic insomnia treatment, and connect PCPs with specialists
20 who provide CBT-I or familiarize them with online CBT-I (Baglioni et al., 2020).

21 Our results suggest that informing PCPs about the benefits of CBT-I and connecting them with local
22 CBT-I providers could increase the proportion of Swiss PCPs who prescribe the first-line treatment
23 recommended by guidelines and also reduce the number of patients treated with medication, especially
24 in the presence of depression.

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44

1 **Supplementary Table 1** Treatment options presented to the primary care physicians.

Pharmacological	Non-pharmacological	Complementary-alternative
Phytopharmaceutical	CBT-I	Acupuncture
Antidepressant	Sleep restriction	Homeopathy
Benzodiazepine receptor agonist	Sleep hygiene	Other (<i>free text</i>)
Melatonin	Relaxation therapy	
Antihistamine	Other psychotherapy	
Benzodiazepine	Increasing physical activity	
Antipsychotic	Light therapy	
Other (<i>free text</i>)	Hypnosis	
	Other (<i>free text</i>)	

2

3 **Supplementary Table 2** Number of missing values for each variable with missing data.

Variable	Missing values
Age	4
Sex	3
Experience as a PCP	1
Knowledge about CBT-I	1
CBT-I provider knowledge	3
Interest in learning more about pharmacological treatment of chronic insomnia	1

4