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Tinnitus healthcare: a survey revealing extensive variation in opinion and practices across Europe

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Keywords:	Tinnitus, Health services evaluation, standard of care, Pan-European, Guidelines, Barriers

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Title page**Title:****Tinnitus healthcare: a survey revealing extensive variation in opinion and practices across Europe****Authors:**

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Abstract:

Tinnitus remains a scientific and clinical problem whereby, in spite of increasing knowledge on effective treatment and management for tinnitus, very little impact on clinical practice has been observed. There is evidence that prolonged, obscure, and indirect referral-trajectories persist in usual tinnitus care.

Aim: It is widely acknowledged that efforts to change professional practice are more successful if barriers are identified and implementation activities are systematically tailored to the specific determinants of practice. The aim of this study was to administer a health-service evaluation survey to scope current practice- and knowledge of standards in tinnitus care across Europe. The purpose of this survey was to specifically inform the development-process of a European clinical guideline that would be implementable in all European countries.

Method: A survey was developed by the study steering group, piloted on clinicians from the TINNET network, and underwent two iterations before being finalized. The survey was then administered to clinicians and policy makers from 24 European countries.

Results: Data collected from 625 respondents revealed differences in national healthcare structures, tinnitus-definitions, characteristics of tinnitus -patients, assessment procedures, and particularly in available treatment options. Differences between northern and eastern European countries were most notable.

Discussion: Most European countries do not have national clinical guidelines for the management of tinnitus. Reflective of this, clinical practices in tinnitus healthcare vary dramatically across countries. This equates to inequities of care for people with tinnitus across Europe and an opportunity to introduce standards in the form of a European clinical guideline. This survey has highlighted important barriers and facilitators to implementation of such a guideline.

Keywords: Tinnitus, health-service evaluation, Standard of care, Pan-European, Guidelines, Barriers, Facilitators

Strengths & Limitations

Strengths:

- This is the first and only pan-European health-service evaluation to scope current practice- and knowledge of clinical standards in tinnitus healthcare, which offers valuable information for ongoing endeavors to develop multidisciplinary guidelines and a standard of tinnitus health-care across Europe.
- Results provide health service information and expert opinions on national healthcare structures, reflecting a truly pan-European point of view.
- Based on the results we have succeeded in defining important barriers as well as facilitators to the development and implementation of a guideline that can serve the whole of Europe, by being meaningful and actionable, and offer advice and options for professionals in the field and the patients they care for.

Limitations:

- From the 24 countries who participated in the survey, some had many more respondents than others. Responses from Lithuania and the Czech Republic might have a strong influence on the eastern region data, because of the large number of respondents from these countries.
- Most respondents were otologists. The large (over)representation of this discipline might indicate that other disciplines are less involved in tinnitus health care and that current reports rely heavily on the clinical views and experiences of otologists and might not reflect views or opinions of professionals of other disciplines.
- Important to note is that the current findings do not necessarily indicate or reflect a right or wrong in the organisation of tinnitus healthcare. Current results are seen in the light of establishing potential facilitators and barriers

Introduction

Tinnitus, the perception of a phantom sound, is a widespread auditory symptom [1]. It can occur with several otological disorders, such as sensorineural hearing loss. In rare cases, tinnitus can be traced to an underlying pathology, though uniform aetiology remains undetermined [2]. Epidemiological findings are difficult to pool across studies due to differences in methodologies [3]. Nonetheless, assuming a conservative tinnitus prevalence of 10% (severe tinnitus of 1%), tinnitus affects more than 42 million European Union (EU) adults and is a severe problem by more than four million adults. According to data from two large cohorts from Wisconsin (USA), tinnitus prevalence is increasing over time (on average by 1.4% each 5-year birth cohort) [4]. Assuming this increase is linear and of similar magnitude, prevalence estimates will double by 2050.

Tinnitus is residing within and confined to the individual's subjective perceptual experience, not measurable or quantifiable by objective physical recordings, and furthermore not traceable to disease, injury, or pathology in the brain or elsewhere. Even though knowledge on the pathophysiology of tinnitus has made some progress [5, 6] there is still little evidence for effective curative tinnitus treatments or licensed pharmacological therapy [7]. The Cochrane Library currently includes nine systematic reviews on different tinnitus treatments [8], all of which are reported to have little, if any, quality evidence [9]. Patients report difficulties in concentration, being anxious and distressed, difficulty sleeping, being interrupted in their daily tasks, and feeling helpless and despondent most of the time. Evidence corroborates that cognitive misinterpretations, negative emotional reactivity, and dysfunctional attentional processes are of main importance to the severe tinnitus condition [10-20].

From a scientific and clinical perspective, the increased knowledge on treatment and management for tinnitus has had minimal impact on clinical practice [2]. There is evidence that prolonged, obscure and indirect referral-trajectories persist in usual tinnitus care [21]. Tinnitus is indeed a highly complex condition with a multifactorial origin. Heterogeneous patient-profiles lead to a lack of consensus on standard assessment and treatment approaches, which in turn again lead to increasing complaints, prolonged suffering, and endless referral trajectories, resulting in enormous psychological, societal, and economic burden [22].

In 2014, the EU approved funding for a four-years COST Action (TINNET) to create a pan-European tinnitus research network. TINNET's working group 1 (WG1) consists of clinical

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3 and academic experts in tinnitus from across Europe whose joint objective is to develop
4 meaningful and actionable clinical guidelines for the assessment and treatment of tinnitus
5 patients, and to provide a consensus-based clinical definition and characterization of tinnitus¹.
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7 Ultimately, a European multidisciplinary clinical guideline would be a first step towards a
8 common minimum standard of care for tinnitus patients across Europe. To ensure from a
9 development perspective that a European guideline would become implementable, it became
10 essential to scope current existence and knowledge of standards in tinnitus care across the
11 continent. Without knowledge on the current ‘state of the art’ and standards in tinnitus healthcare,
12 a consensus-based, meaningful, and actionable guideline could not be ensured. It is widely
13 acknowledged that efforts to change professional practice are more successful if barriers are
14 identified and guidelines for implementation activities are systematically tailored to the specific
15 determinants of practice [23]. As such, a pan-European survey of clinicians and policy makers
16 was carried out to gain service information and expert opinions on national healthcare structures,
17 tinnitus-definition, general characteristics of tinnitus patients, and assessment and treatment
18 options.
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30 **Methods**

31 The method for scoping current knowledge, opinion, and practices in tinnitus care across Europe,
32 a web-based survey was developed by consensus of members within TINNET WG1.
33 Participation was on a voluntary basis and all data were submitted anonymously.
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39 *Survey development*

40 The survey was developed during three consecutive WG1 meetings. It was agreed that the survey
41 would be developed in the English language, since it was expected that most responders would be
42 able to understand English, irrespective of the country of origin. The development involved two
43 phases. First, based on their shared knowledge of tinnitus, nine members of the WG1 steering
44 group generated a list of domains of interest, formulated a set of questions for each domain, and
45 generated a set of response options for each question. This list of questions was subsequently
46 piloted in a larger group of WG1 members (n=81) via e-mail, and during a WG1 management
47 meeting. Consensus-rounds were used to either include or exclude items. The remaining survey
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56 ¹ <http://tinnet.tinnitusresearch.net/index.php/2015-10-29-10-22-16/wg-1-clinical>
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3 items were then re-disseminated to all WG1 members who had been involved in the development
4 and piloting stages with a request to provide comments on any necessary alterations, changes to
5 wording or response options, and for any general remarks. A final survey was agreed upon and
6 produced for online dissemination using Google-forms. The final survey contained items grouped
7 as (1) Demographics, (2) National healthcare structure, (3) Tinnitus-definitions and
8 characteristics of the tinnitus-patient, and (4) Management, treatment and diagnostics.
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14 15 *Participants*

16 The recruitment targeted clinical experts, researchers and policy makers involved in national
17 tinnitus healthcare and decision making. A total of 625 participants were recruited using the
18 COST-TINNET network. Firstly, members of the management committee of TINNET were
19 contacted via e-mail with a link to the survey (Supplemental information 1 provides the questions
20 used in the survey) and were requested to forward the invitation to clinical experts, researchers,
21 and tinnitus- organizations in their respective countries (n=24; Table 1). Secondly, another round
22 of targeted dissemination was performed in July 2015, as at that time it was noted that there was a
23 lower response rate from some countries. The low response rate from Italy and Spain was
24 identified as being a language barrier and therefore the survey was translated by native-speaking
25 TINNET members and re-distributed in their national language. The reason for low responses
26 from other countries was not identified. The survey was open from January to October 2015.
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37 38 *Patient and Public Involvement*

39 The aim of the current study falls within the framework and main aims of the COST TINNET
40 project¹. The project and in particular working-package 1 focussed on the objective “Clinical and
41 audiological assessment of tinnitus patients according to common standards”. The current study
42 was an essential step in the roadmap towards the aim of the project [24]. In the development and
43 execution of the TINNET project patient-organisations throughout Europe were consulted and we
44 actively involved in several stages. In the current survey, no individual patients were recruited,
45 nor were they involved, since this study involved the evaluation of health-services by clinicians,
46 policy makers, and individual professional expert opinions on national healthcare structures.
47 Results of the current study were disseminated to all existing European patient organisations
48 using a Delphi consensus methodology in the development of harmonized and adaptive clinical
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3 European guidelines for tinnitus entitled "Multidisciplinary European Guideline for Tinnitus:
4 Diagnostics, Assessment and Treatment". These have been presented to the scientific community
5 as well as national patient organisation symposia . The manuscript is currently prepared for peer-
6 reviewed publication.
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10 11 12 13 *Analyses*

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15 Results were first described and depicted descriptively. Because the number of responses from
16 each country differed, data were stratified according to whether the country was in northern
17 (higher income), southern (moderate income), or eastern (lower income) Europe (**Table 1**).
18 (Supplemental information 2 gives the average monthly net income per country and per region).
19 The rationale for this classification was that economic prosperity might lead to differences in
20 health-care for tinnitus patients, since lesser resources indicate lower availability of specialized
21 health-care. One-way ANOVA and regression analyses were performed to assess differences and
22 associations between variables in, northern, southern, and eastern countries. All analyses were
23 performed in IBM-SPSS version 23.
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31 32 **Results**

33 *Demographics*

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35 Survey responses (n=625) were received from participants across 24 countries (**Figure 1**) with a
36 large number of participants from Lithuania, Czech Republic, Portugal, and Spain. The mean age
37 of respondents was 43.9 years (SD=12.4), 49.7% were male and 50.3% were female.
38 Respondents were from many disciplines (**Figure 2**), and worked in public healthcare (n=291),
39 private healthcare (n=199), university (n=89) or other setting (n=48). Some respondents reported
40 more than one workplace (n=213).
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Table 1. Classification and percentage of respondents according to region; 1=North, 2=South, 3=East

Country	Region	n per country	n per region	Percentage of total
Region 1			216	34.6%
AUSTRIA	1	1		
BELGIUM	1	54		
DENMARK	1	14		
FINLAND	1	1		
FRANCE	1	39		
GERMANY	1	28		
NETHERLANDS	1	41		
SWEDEN	1	23		
SWITZERLAND	1	3		
UK	1	12		
Region 2			225	36.0%
CYPRUS	2	2		
GREECE	2	29		
ITALY	2	50		
ISRAEL	2	12		
MALTA	2	9		
PORTUGAL	2	64		
SPAIN	2	59		
Region 3			184	29.4%
ALBANIA	3	2		
CROATIA	3	2		
CZECH REPUBLIC	3	68		
LITHUANIA	3	82		
POLAND	3	19		
SERBIA	3	8		
SLOVENIA	3	3		
Total		625	625	100

National healthcare structure

Across all three regions of Europe, tinnitus healthcare is in most cases financed by national health insurances. This was particularly evident for eastern countries where 90.8% of respondents

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3 reported that their service is publicly funded. Privately funded treatment is most common in
4 southern Europe (48%) (Supplemental Information 3).
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8 The most common referral pathways as well as the description of services and patients status are
9 given in **Figure 3** and **Table 2** respectively. In taking a regional perspective, difference across
10 Europe became clear. Specialised tinnitus clinics (or teams) are perceived to be most present in
11 the Northern regions (more than 50% of respondents confirmed), where referral by ENT and/or
12 Audiology seems common. Whereas in Southern Europe many people appear to self-refer to
13 specialists, in Eastern Europe referral opinions vary or are less understood by respondents. More
14 northern European respondents reported having and using clinical guidelines (Supplemental
15 information 4) than respondents from southern or eastern Europe.
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31 *Tinnitus, definitions, and characteristics of the tinnitus-patient*

32 In all regions, more experts report that, in their opinion, tinnitus is either a peripheral or central
33 auditory symptom (**Table 2**). Still, more than 10% from all regions considered tinnitus a disease,
34 whether auditory or psychological. Differences were found between higher and lower income
35 regions with respect to the perceived emotional status of their ‘typical’ patients (**Table 2**) and the
36 time spent with individual patients during the first consultation (**Table 3**). The majority of
37 respondents from northern Europe (41.7%) reported spending between 30-60minutes with
38 tinnitus patients on the first appointment, in contrast to 43.9% in the south and 56% in the east
39 spending between 15-30 minutes. Patients in northern Europe were evaluated as being more often
40 “somewhat distressed” in comparison to a more “neutral” status in the south and east (see also
41 Supplemental information 5).
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Table 2. View of 'Tinnitus' and emotional status of patients, classified according to region

	North		South		East		Sign.
	N	%	N	%	N	%	
What Is Tinnitus?							
A central auditory disease	8	3,7	9	4,0	17	9,2	
A central auditory symptom	88	40,7	64	28,4	37	20,1	
A peripheral auditory disease	11	5,1	17	7,6	12	6,5	
A peripheral auditory symptom	100	46,3	126	56,0	110	59,8	
A psychological disease	4	1,9	1	0,4	5	2,7	
Combination/ Multiple causes/ Other	5	2,3	6	2,7	3	1,6	
Cannot answer/does not know			2	0,9			
Chronic or acute?							n.s.
Chronic (>3months)	123	56,9	144	64,6	104	56,5	
Acute (<3months)	19	8,8	18	8,1	27	14,7	
Both	74	34,3	61	27,4	53	28,8	
Emotional status most patients?							**
Very positive	1	0,5	0	0	5	2,7	
Somewhat positive	22	10,2	22	9,9	25	13,6	
Neutral	56	25,9	102	45,7	96	52,2	
Somewhat distressed	113	52,3	87	39,0	43	23,4	
Very distressed	24	11,1	12	5,4	15	8,2	

* Different between all groups ($\alpha < .05$)

**Difference between North compared to South and East ($\alpha < .05$)

n.s.: Not significant; Sign: Significant difference

Table 3. Appointment duration and number of patients per month, classified according to region

	North		South		East		Sign. *
	N	Percent	N	Percent	N	Percent	
Duration of the 1st consultation							
less than 15 minutes	23	10,6	37	16,6	55	29,9	
15 to 30 minutes	51	23,6	98	43,9	103	56,0	
30 to 60 minutes	90	41,7	58	26,0	21	11,4	
60 to 120 minutes	44	20,4	25	11,2	5	2,7	
more than 120 minutes	8	3,7	5	2,2	0	0	
Number of patients per month	N	Percent	N	Percent	N	Percent	*
≤10	73	33,8	117	52,2	101	54,9	
11-30	96	44,4	87	38,8	61	33,2	
31-50	33	15,3	12	5,4	9	4,9	
> 50	14	6,5	8	3,6	13	7,1	

* Different between all groups ($\alpha < .05$)

**Difference between North compared to South and East ($\alpha < .05$)

n.s.: Not significant; Sign: Significant difference

Management, treatment, and diagnostics

All treatments available within their respective departments were reported (Table 4). Where medication was selected as an available option, the respondent were asked to indicate the specific drug in the 'other' free-text space. Here sound therapy is taken to include the use of hearing aids, and TRT includes any reportedly modified version of the treatment.

Medications used in tinnitus treatment included betahistine, steroids, vasodilators, antidepressants, and anxiolytics. 'Other' treatment options reported as available were hyperbaric chamber therapy, laser therapy, transcranial direct current stimulation, Gingko biloba, Vitamin B12, hypnosis, sleep hygiene, osteopathy, cochlear implantation, and music therapy. Differences in treatment availability across regions were striking, particularly between the north and east. Indicative of the general trends, CBT was available from 34.3% of departments in northern Europe, compared to just 4.9% in the east. In contrast, medication was an option in 79.9% of the departments in the east, whereas only 27.3% used medications in the north. While medication

was the most commonly available treatment option in the east, in both the north and south it was sound-based therapy (in 69.9% and 68.4% of departments respectively).

Table 4. Treatments reported as available within respondents departments, reported by region.

	North (n)	%	South (n)	%	East (n)	%
Advice	2	0	0	0	0	0
Alternative therapies	16	7.5	33	14.7	19	10.3
CBT	74	34.3	35	15.6	9	4.9
Counselling	108	50	115	51.1	41	22.3
Coping training	0	0	0	0	0	0
Dental procedure	2	0.9	0	0	0	0
Medication	59	27.3	111	49.3	147	79.9
Mindfulness	5	2.3	0	0	0	0
Neurofeedback	16	7.4	13	5.8	9	4.9
Physiotherapy	52	24.1	27	12	59	32.1
Relaxation	108	50	71	31.6	34	18.5
rTMS	14	6.5	3	1.3	3	1.6
Sound therapy	151	69.9	154	68.4	49	26.6
TRT	1	0.5	69	30.7	29	15.8

Clinicians involved in tinnitus care ranged from just one discipline to a broad multidisciplinary team (**Table 5**). Multidisciplinary treatments (MDT) and having a psychologist in the team was more common in northern countries than in the east and south. In the east, most care appears to be delivered by medical professionals (otolaryngologists or neurologists). Other disciplines involved in tinnitus care, reported by 1-2% of respondents, included prosthetists, social workers, movement therapists, osteopaths, sophrologists, psychosomatic medicine specialists, acupuncturists, hearing therapists, ophthalmologist, dance movement therapists, general practitioners, cardiologists, maxillofacial surgeons, and radiologists. There were single reports of

an arts therapist, counsellor, speech therapist, mindfulness instructor, and hypnotherapist being involved in care.

Table 5. Disciplines involved in tinnitus care

	North	percent	South	percent	East	percent
ENT	118	54.6	43	19.1	87	47.3
Audiologist	132	61.1	39	17.3	57	31
Psychologist	136	63	32	14.2	24	13
Psychiatrist	33	15.3	39	17.3	39	21.2
Physiotherapist	19	8.8	3	1.3	3	1.6
Neurologist	20	9.3	19	8.4	81	44
Dentist	3	1.4	1	0.4	0	0

Conditions and or symptoms perceived as being of relevance when assessing and/or treating tinnitus are given in **Table 6**. Most respondents reported hearing loss and dizziness complaints as relevant, irrespective of the region.

Other conditions frequently reported by respondents as of relevance to tinnitus were suicidal tendency, otitis, eustachian tube dysfunction, acoustic neuroma, multiple sclerosis, and coagulation disorder. A minority ($\leq 1\%$) additionally reported hyperacusis, autoimmune disease, neurovascular conflict, Pendred syndrome, stress, psychosis, nasal septal deformation, vascular disease, facial pain, sensory hypersensitivity, cardiac arrhythmia, arterial stenosis, sleep disorders, hypercholesterolemia, fibromyalgia, apnoea, and rhinosinusitis.

Table 6. Opinions on which conditions are taken into consideration in tinnitus diagnostics

	North	percent	South	percent	East	percent
Hypertension	98	45.4	118	52.4	79	42.9
Diabetes	45	20.8	108	48	55	29.9
Thyroid dysfunction	0	0	1	0.4	0	0
TMJ disorders	92	42.6	125	55.6	28	15.2
Psychological/psychiatric disorders	155	71.8	163	72.4	73	39.7
Hearing loss	212	98.1	221	98.2	159	86.4
Hyperlipidaemia	16	7.4	61	27.1	31	16.8
Dizziness	191	88.4	200	88.9	161	87.5
Cervical disorders	100	46.3	98	43.6	94	51.1
Migraine	72	33.3	83	36.9	41	22.3
Allergy	21	9.7	35	15.6	11	6

There was a general consensus on the diagnostic tools to be used to assess tinnitus patients in clinical practice (**Table 7**). Most respondents reported that otoscopy and pure tone audiometry were used. There was some variability in the reported use of other diagnostic tools, e.g. percentage use of audiological assessments such as tympanometry or speech audiometry in the north was twice that in the east. ‘Other’ responses included clinical interview, Diagnostic and Statistical Manual of Mental Disorders, vestibular evoked myogenic potential, brainstem evoked response audiometry, tone decay, neck vessel ultrasonography, orthopantomography, blood analysis, vestibular testing (calorimetry), blood pressure, and auditory brainstem response, all of which were reported by $\leq 3\%$ of respondents.

Table 7. Diagnostic tools used with tinnitus patients

	North	percent	South	percent	East	percent
Otoscopy	169	78.2	211	93.8	135	73.4
Tympanometry	142	65.7	172	76.4	56	30.4
Nasal endoscopy	37	17.1	87	38.7	147	79.9
Pure tone audiometry	162	75	186	82.7	151	82.1
High frequency audiometry	64	29.6	48	21.3	27	14.7
Speech audiometry	119	55.1	93	41.3	44	23.9
Tinnitus pitch and loudness	95	44	86	38.2	46	25
LDL	2	0.9	1	0.4	0	0
LMM	1	0.5	0	0	0	0
IR	1	0.5	0	0	0	0
Broadband noise EP	0	0	0	0	0	0
Pure tone EP	0	0	0	0	0	0
(DP)OAE	68	31.5	54	24	35	19
AC-ASSR	9	4.2	18	8	4	2.2
EEG	14	6.5	3	1.3	16	8.7
CT	17	7.9	34	15.1	44	23.9
MRI	76	35.2	119	52.9	100	54.3
Angio-MRI	28	13	37	16.4	19	10.3

Most respondents from northern and southern countries reported using some form of multi-item questionnaire, in comparison with only about one in five respondents from eastern European countries (**Figure 4**). In eastern countries, the use of these measures is much less common. The most frequently used questionnaire, irrespective of region was the Tinnitus Handicap Inventory (THI) [25]. Interestingly, the only anxiety/depression questionnaire used was the Hospital Anxiety and Depression Scale (HADS) [26] and this in Eastern countries. The Tinnitus Questionnaire (TQ) [27] was mentioned frequently in northern and southern regions. The more recently developed Tinnitus Functional Index (TFI) [28] was only mentioned in the North. Additionally, respondents from all regions specified to use visual analogue scales (though unspecified which) as well. Questionnaires reported as ‘other’ were unspecified.

INSERT FIGURE 4 ABOUT HERE

Finally, regarding the satisfaction rate on the service provided by their health care unit, 81.7% respondents from the north, 38.5% from the South, and 35.0% from the east reported they were.

In northern Europe professionals were largely satisfied, whereas in southern and eastern Europe opinions were more divided, and less than half of respondents claimed to be satisfied.

Regression analyses

Regression analyses were conducted to establish whether there were statistically significant associations between average net income of the country of origin of respondents and the presence of specialised tinnitus-clinics, time for tinnitus-patients per consult, satisfaction of the respondent with their service, number of patients seen per month, the requirement of a referral by GP in their country, and whether or not clinical guidelines exist. Significant associations were found between net income per month and all variables in the model (**Table 8**). In summary, higher income was associated with more specialised clinics, longer appointment times, greater satisfaction with health-care options, fewer patients per month, more referral-necessity by GP, and more knowledge and use of clinical guidelines.

Table 8. Associations between income and tinnitus care. Regressions summary: Dependent = income, Independents = Specialised clinics present, time per consult, Satisfaction of respondent with healthcare, Patients seen per month, Necessity of referral by GP, Existence of clinical guidelines, controlled for age and gender.

Model	Change Statistics				Beta	Sig. F Change
	R Square					
	Change	F Change	df1	df2		
Age / gender	0,007	1,989	2	605	-0,033	0,138
Specialised clinic	0,266	220,407	1	604	-0,516	0,000
Time per consult	0,106	102,780	1	603	0,334	0,000
Satisfaction healthcare	0,048	50,505	1	602	-0,235	0,000
Patients per month	0,015	15,728	1	601	0,124	0,000
GP necessary	0,010	10,507	1	600	-0,106	0,001
Clinical guidelines	0,008	9,272	1	599	0,094	0,002

Dummy coding: Specialised clinic: Yes=0, No=1; Time per consult: 1=< 15 min, 2=15-30min, 3=30-60min, 4=60-12min, 5=>120min; Satisfaction healthcare: Yes=0, No=1; GP necessary: Yes=0, No=1; Clinical guidelines: Yes=0, No=1. Dependent: income

Discussion

This survey sought to collate details and opinions on healthcare structure and clinical practices for tinnitus across Europe. The first interesting result from the survey was the difference between regions of Europe in terms of whether specialist tinnitus clinics are present. In the northern countries of Europe, most respondents confirmed the presence of specialised tinnitus clinics, in the South about half confirmed having specialist centres, and in the East most respondents reported not having specialised clinics. That there seems to be discord in knowledge or opinions in the rest of Europe is interesting. Where there are indeed specialised clinics, which professionals are aware of, they might more easily refer patients to these clinics without the need for a GP. On the other hand, when fewer clinics are present or known, tinnitus care more often falls to the GP, who might refer to a specialist, but not necessarily to a specialised centre. Opinions differ on whether a referral from a GP is necessary; the majority of respondents from Eastern Europe reported that it is indeed the case, whereas in northern and southern Europe less than half of respondents thought so. These findings indicate the importance of knowing the referral path. The lack of knowledge of existing specialised clinics also makes it difficult for tinnitus patients to identify the most appropriate professionals in their country. Addressing the lack of clinician's knowledge is key in the development of meaningful and actionable European guidelines.

In terms of national healthcare structure, the typical pathways differ by region. In the north they most commonly include specialised audiologists and otolaryngologists, who can presumably refer onto specialist centres where available. In southern Europe it was more common that people self-refer for tinnitus care. In Eastern Europe referral pathways were either less understood or less well-defined.

When asked which disciplines usually 'handle' tinnitus patients, the mix of disciplines reported was more evenly distributed across the counselling and medical professions in northern countries than other regions, i.e. tinnitus care was not more associated with one type of healthcare professional than another. In contrast, in southern and eastern countries it is reported that medical and technical professionals are most commonly involved. Interestingly this indicates a tendency towards a 'psychological' approach in the north compared to a more curative approach in tinnitus

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3 treatment in the other regions. Since there is ample evidence that psychological therapy is
4 beneficial in any tinnitus treatment approach, and that there are regions in Europe where this is
5 not provided, these findings highlight a *second barrier* in to the adoption and implementation of a
6 Europe wide practice guideline.
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11 In all regions, opinions varied on whether tinnitus is a peripheral or central auditory symptom or
12 condition. This data will be useful in achieving a consensus definition of tinnitus within a
13 European guideline. Interestingly, respondents from northern countries more often reported their
14 average patients to be distressed, whereas most respondents from the south and east judged their
15 patients to be neither distressed nor 'positive' but to be of a 'neutral' emotional status. This could
16 indicate that in the north, the range of patients that are seen by experts is broader, i.e. patients
17 with milder as well as more severe tinnitus are assessed by specialists. It is also possible that
18 since northern countries dedicate more time per patient, physicians are more able to assess levels
19 of distress. It might also reflect a greater awareness of the emotional distress of patients since in
20 the north, a psychological assessment including clinical questionnaires is more often conducted.
21 This is of interest because the level of distress of tinnitus patients is an important indicator of the
22 need for onward referral for subsequent treatment options. A third barrier to the implementation
23 of a European guideline may therefore be that in most regions of Europe, professionals
24 responsible for tinnitus patients do not have a sufficient amount of time to adequately assess the
25 level of distress of their patients.
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39 The presence of a multidisciplinary treatment teams for tinnitus in northern regions was reported
40 in most cases, including a psychologist working in most teams. By region however, it is noted
41 that in the south many respondents report that there are no multidisciplinary treatment teams, and
42 in the east there was almost no psychologists involved in treatment. These findings represent a
43 major fourth barrier in developing the development of meaningful and actionable European
44 guidelines, if the guideline is to include evidence-based healthcare.
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51 There is consensus across the regions on which conditions are important in tinnitus. Most
52 respondents, irrespective of region, reported hearing loss, acoustic trauma, and vertigo as the
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3 most relevant conditions to consider in the assessment of tinnitus. This consensus represents a
4 second facilitator in discussions on and implementation of European guidelines,
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8 The treatment options reported by respondents also showed clear trends according to region. This
9 finding can be classified as a *fifth barrier*, in that it might be difficult to get consensus on what
10 works for whom when many treatment avenues are preferentially made available. When
11 developing a guideline it is of importance to provide clear indications on which treatments are
12 recommended, which are not recommended, and which have insufficient evidence to make a
13 recommendation in either direction [29].
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20 There was consensus on the diagnostic tools to be used to assess tinnitus patients in clinical
21 practice. Although some small differences in procedures were reported, most experts use
22 otoscopy and pure tone audiometry. There is some variability in the use of other diagnostic tools
23 suggesting a potential third facilitator to discussions, on the inclusion of standardised diagnostic
24 procedure in the guidelines.
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30 A sixth barrier to standardised practice emerging from our data may be the limited use of clinical
31 questionnaires in eastern and southern countries. Yet consensus exists that in research as well as
32 the clinic questionnaires are key in assessment, both for screening and monitoring treatment
33 progress [2, 30]. The most commonly used questionnaire however, irrespective of region, was the
34 Tinnitus Handicap Inventory (THI). This finding is consistent with a previous study [31]. This
35 might offer a fourth facilitator to discussions, on primary outcome measures to recommend
36 within a guideline.
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44 When asked how patients pay for treatment, respondents from southern and eastern Europe
45 reported fewer patients pay privately for their tinnitus healthcare. Nonetheless, in all regions,
46 tinnitus treatments were financed by national health insurance schemes. This may become
47 restrictive if health insurance companies have a strong influence on what tinnitus treatment
48 options are made available within a country. When patients pay for treatment privately, more
49 treatment options might be on offer, even without adequate evidence of effectiveness. That there
50 are differences in how patients pay for treatment is a seventh barrier to standard care across
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3 Europe, and a difficult one. In cases where the regulatory bodies in health care in a country are
4 unwilling or unable to hold to the restrictions or recommendations stated in a guideline, the
5 chances of implementation of this guideline drastically decrease.
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10 Less than half of respondents from the south and east of Europe reported they were satisfied with
11 current tinnitus healthcare in their country. This dis-satisfaction may represent a fifth facilitator in
12 that professionals are likely to be positive about progressive guidelines and towards changes in
13 healthcare for tinnitus.
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18 Finally, economic prosperity in a country often defines healthcare organization and healthcare
19 satisfaction [32]. In the current study, it was hypothesized that the economic resources available
20 to individuals in a country might dictate the view of professionals on levels of advancement in
21 healthcare for tinnitus. This was indeed the case. Lower average net income in the country of
22 origin of respondents was associated with reports of fewer specialized tinnitus healthcare; fewer
23 specialised tinnitus-clinics, less time for tinnitus-patients per consult, and more often a lack (or
24 use) of guidelines. Lower average income was also associated with lower satisfaction of the
25 respondent with healthcare, and more necessity of referral by a GP. Interestingly, higher average
26 net income in a country was associated with seeing more patients per month. This might be
27 because the problem is better understood, patients are better recognised, or suffering is taken
28 more seriously.
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39 Some additional points are worthy of discussion. First, from the 24 countries who participated in
40 the survey, some had many more respondents than others. This issue was presently solved by
41 stratifying the countries according to region of Europe to yield similar respondent numbers per
42 region. Nevertheless, responses from Lithuania and the Czech Republic might have a strong
43 influence on the eastern region data, because of the large number of respondents from these
44 countries. Second, most respondents were otologists. The large (over)representation of this
45 discipline might indicate that other disciplines are less involved in tinnitus health care, and that
46 current reports rely heavily on the clinical views and experiences of otologists and might not
47 reflect views or opinions of professionals of other disciplines. Third, it is important to note that
48 the current findings do not necessarily indicate or reflect a right or wrong in the organisation of
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tinnitus healthcare, the available assessment and treatment options for tinnitus in a country, or the advancement of specialised healthcare in a country. It is important that the current results are seen in the light of establishing potential facilitators and barriers (see Box 1 below for summary) to the development and implementation of a guideline that can serve the whole of Europe, by being meaningful and actionable, and offer advice and options for professionals in the field, and the patients they care for.

BOX 1: Summary of Barriers and Facilitators

Barriers

- 1** Lack of knowledge about or non-existence of specialised tinnitus clinics or teams makes it difficult for tinnitus patients to find their way to the most appropriate professionals in a country.
- 2** Lack of time or other resources for adequate counselling
- 3** Lack of time or other resources for professionals responsible for tinnitus patients to be able to adequately assess the distress-level of tinnitus patients
- 4** Lack of multidisciplinary teams, and/or availability of psychologists in southern and eastern European countries
- 5** High variation in available treatment options; more medical-pharmacological treatment in southern and eastern countries. psychological-rehabilitative approaches more available in northern countries. When many treatment avenues are considered viable it may be difficult to reach consensus on what works for whom
- 6** The use of self-report instruments is much less common in southern and eastern countries
- 7** There are differences in how patients pay for treatment. If regulatory bodies in healthcare in a country are unwilling or unable to hold to the restrictions or recommendations stated in a guideline, the likelihood of implementation of this guideline is lower.

Facilitators

- 1** Common ground in expert-opinion that tinnitus is a central auditory symptom. This offers options for discussions on the definition of tinnitus in a European guideline
- 2** Consensus across regions on what conditions are relevant or associated with tinnitus. Harmonies such as these are to be highlighted where possible to facilitate implementation of a standard guideline
- 3** Though some small differences in procedures were reported, most experts use otoscopy and pure tone audiometry. Findings will facilitate discussions on diagnostics to include in the guidelines
- 4** The most commonly used questionnaire irrespective of region is the Tinnitus Handicap Inventory. This may facilitate discussions on assessment methods to recommend within a guideline
- 5** The percentage of respondents satisfied with current tinnitus healthcare in their country in southern and eastern Europe was low; less than half of respondents reported they were satisfied. Healthcare professionals are likely to be positive towards progressive guidelines and towards changes in health care for tinnitus.

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10 the NIHR, the NHS, or the Department of Health and Social Care.
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13 **Competing Interests**

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15 All authors have declared that there are no competing interests
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18 **Figure captions & Legends**

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- 21 • FIGURE 1. Responses from each participating country
 - 22 • FIGURE 2. Discipline of respondents
 - 23 • FIGURE 3: Most common referrals according to region
 - 24 • FIGURE 4. Main questionnaire used per region
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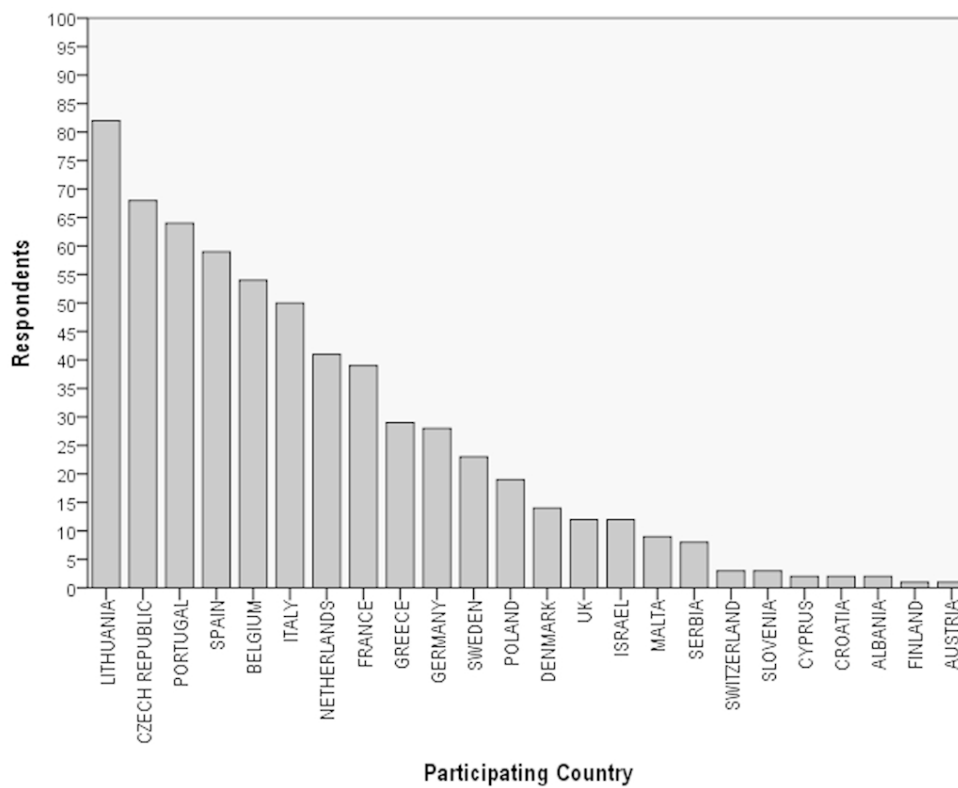


Figure 1. Responses from each participating country

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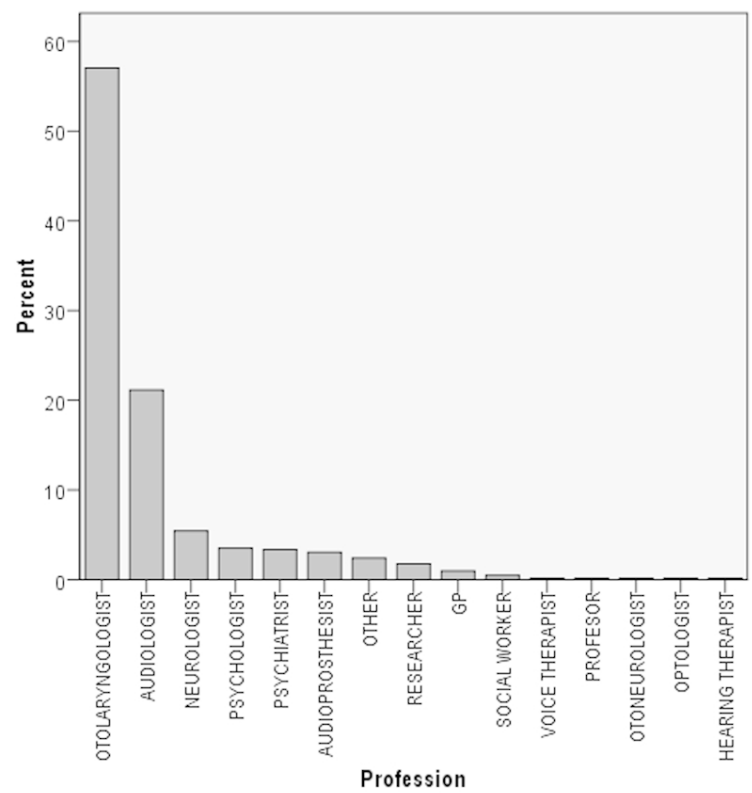


Figure 2. Discipline of respondents
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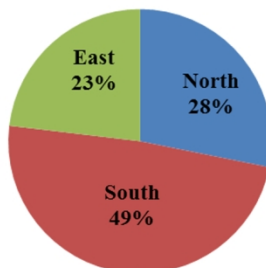
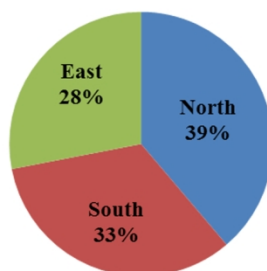
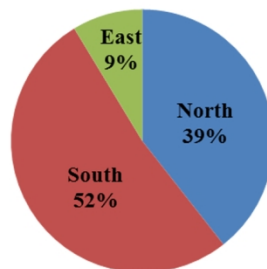
Self-referral most common**Referral by ENT most common****Referral by Audiology most common**

Figure 3. Most common referrals according to region

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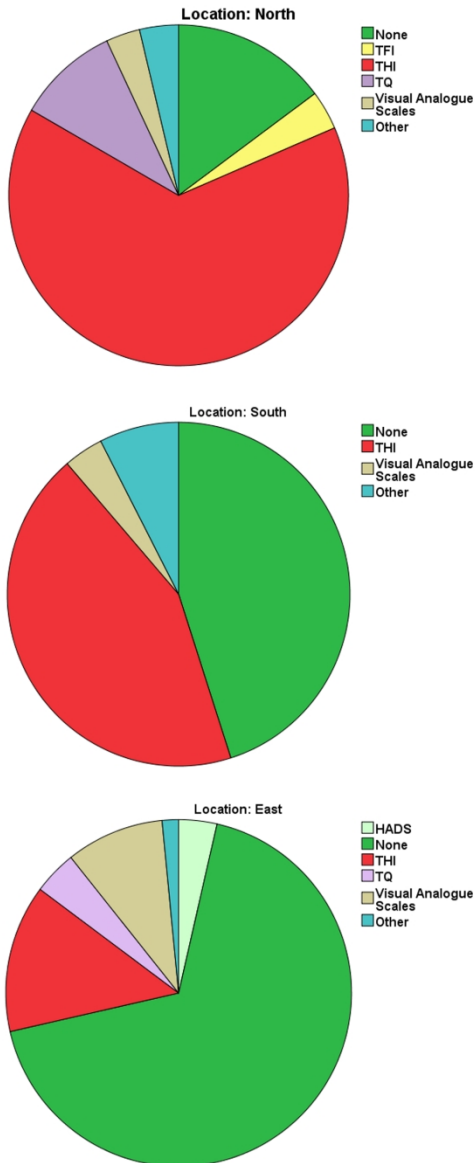


Figure 4. Main questionnaire used per region
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Supplemental information 1: The survey

DEMOGRAPHICS
<p>1. Age</p> <p>2. Gender</p> <p>3. In which country do you reside?</p> <p>4. What is your profession? (Multiple choice). Options: GP, ENT, psychologist, psychiatrist, neurologist, audiologist, other, namely...</p> <p>5. Where do you work? (Multiple choice). Options: Public hospital, private hospital, university, university hospital, private office/practice, other, namely...</p>
NATIONAL HEALTH-CARE STRUCTURE
<p>6. Are there specialized tinnitus healthcare-units in your country? (yes/no)</p> <p>7. What referral pathways for tinnitus patients are typically used in your country? (Multiple choice). Options: GP, ENT, Internet, directly, hospital, psychologist, dentist, community services, other, namely...</p> <p>8. Is a consultation with GP necessary to go to a tinnitus unit/clinic/ENT/Audiological centre? (yes/no)</p>
STATUS OF THE PATIENT
<p>9. Do you consider tinnitus to be...? (Multiple choice). Options: Symptom, disease, audiological problem, psychological problem, none of the above, other, namely...</p> <p>10. What is on average the emotional status of your patient at the moment of first consultation? (5-point Likert). Options: Very positive, somewhat positive, neutral, distressed, very distressed</p> <p>11. Do you see predominantly...? (Multiple choice). Options: Chronic tinnitus (more than 3 months), acute tinnitus (less than 3 months), both</p> <p>12. How much time can you allocate to an individual tinnitus patient in one consultation? (Multiple choice). Options: 1-10 min, 10-30 min, 30-60 min, More than 60 min</p> <p>13. How many tinnitus patients do you see in one week? (Multiple choice). Options: Less than 1, 1-5, 6-10, More than 10</p>
MANAGEMENT OF THE PATIENT
<p>14. Is there a protocol for tinnitus management in your country? (yes/no)</p> <p>b. If yes, how often do you use it? (5-point Likert). Options: Always, almost always, sometimes, almost never, never</p> <p>15. What disciplines most often handle tinnitus patients in your country? (Multiple choice). Options: ENT, audiology, psychology, psychiatry, physiotherapy, neurology, dentistry, other, namely...</p>

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16. Is there a multidisciplinary approach to treat the tinnitus patient? (yes/no)

b. If yes which professionals are included? (Multiple choice). Options: ENT, audiologist, psychologist, psychiatrist, physiotherapist, neurologist, dentist, other, namely...

17. Which medical/psychiatric conditions are taken into consideration when examining tinnitus patients? (Multiple choice). Options: Hypertension, diabetes, thyroid dysfunction, TMJ disorders, psychological/psychiatric disorders, hearing loss, hyperlipidaemia, dizziness, cervical disorders, migraine, allergy, other

TREATMENT AND DIAGNOSTICS

18. What kind of clinical department in your country treats tinnitus patients? (Multiple choice). Options: ENT, audiology, psychology, psychiatry, physiotherapy, neurology, dentistry, other, namely...

19. What are the treatments options for tinnitus patients in your center? (Multiple choice). Options: TRT, CBT, mindfulness, relaxation, coping training, counselling, medication, advise/counselling, alternative therapies, sound therapy, rTMS, neurofeedback, physiotherapy, dental procedure, other

20. What diagnostic tools do you use on a tinnitus patient? (Multiple choice). Options: Questionnaires, micro-otoscopy, tympanometry, nasal endoscopy, pure tone audiometry, high frequency audiometry (12, 16, 20 kHz), speech audiometry (hearing loss), tinnitus pitch and loudness – LDL – LMM – IR, broad band noise EP, pure tone EP, (DP)OAE, air-conduction auditory steady-state responses (AC-ASSR), EEG, CT, MRI, angio-MRI.

21. Which questionnaires do you use to assess tinnitus severity? (Multiple choice). Options: TQ, TRQ, TFI, THI, TFI, TSCH, HADS, BDI, STAI, VAS scales, Grade from 1 to 10, other, namely

22. How do your patients pay for treatment? (Multiple choice). Options: Public health, health insurance, privately, other, namely...

23. Are you satisfied with the current service provided by your healthcare-unit? (yes/no)

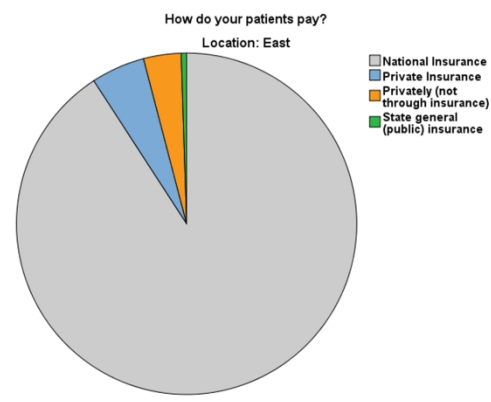
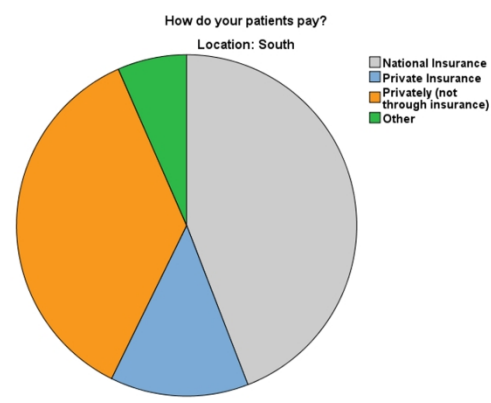
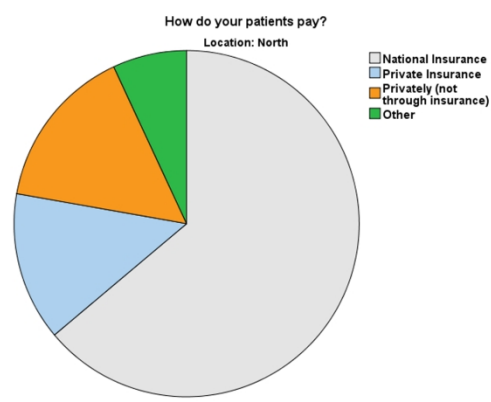
Supplemental Information 2: Average net monthly income per country and per region

n	Region	n	Percent	Income*	
1	ALBANIA	3	2	0,3	370
2	AUSTRIA	1	1	0,2	2009
3	BELGIUM	1	54	8,6	2091
4	CROATIA	3	2	0,3	754
5	CYPRUS	2	2	0,3	1658
	CZECH				
6	REPUBLIC	3	68	10,9	772
7	DENMARK	1	14	2,2	3095
8	FINLAND	1	1	0,2	2509
9	FRANCE	1	39	6,2	2157
10	GERMANY	1	28	4,5	2265
11	GREECE	2	29	4,6	947
12	ISRAEL	2	12	1,9	1924
13	ITALY	2	50	8	1725
14	LITHUANIA	3	82	13,1	616
15	MALTA	2	9	1,4	1021
16	NETHERLANDS	1	41	6,6	2263
17	POLAND	3	19	3	677
18	PORTUGAL	2	64	10,2	984
19	SERBIA	3	8	1,3	377
20	SLOVENIA	3	3	0,5	692
21	SPAIN	2	59	9,4	1718
22	SWEDEN	1	23	3,7	2465
23	SWITZERLAND	1	3	0,5	4760
24	UK	1	12	1,9	2120
24	Total		625	100	

*Average net monthly income

Region	total	mean	n
1	25734	2573,40	10
2	9977	1425,29	7
3	4258	608,29	7

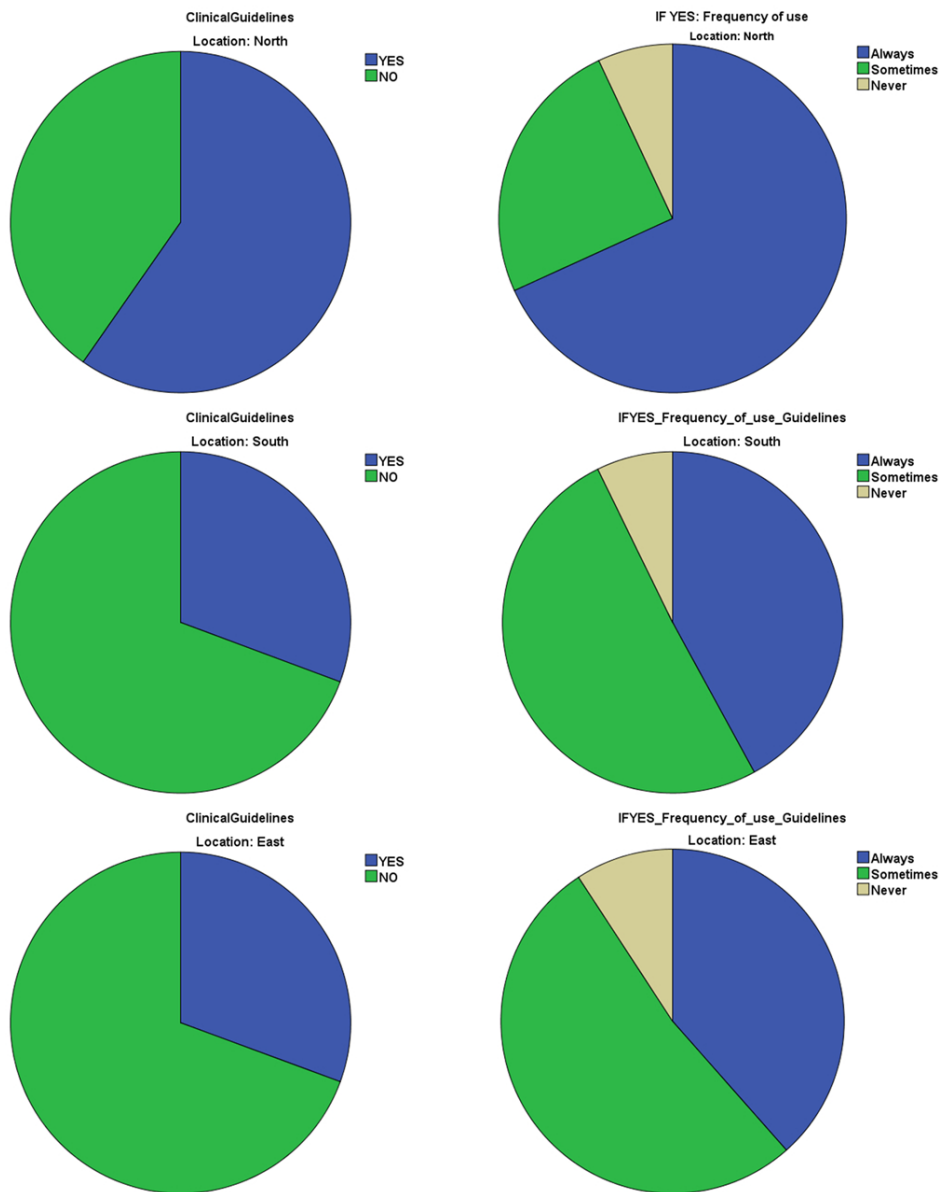
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Supplemental information 3: Financial reimbursement (payment methods) for tinnitus treatments per region

90x216mm (300 x 300 DPI)

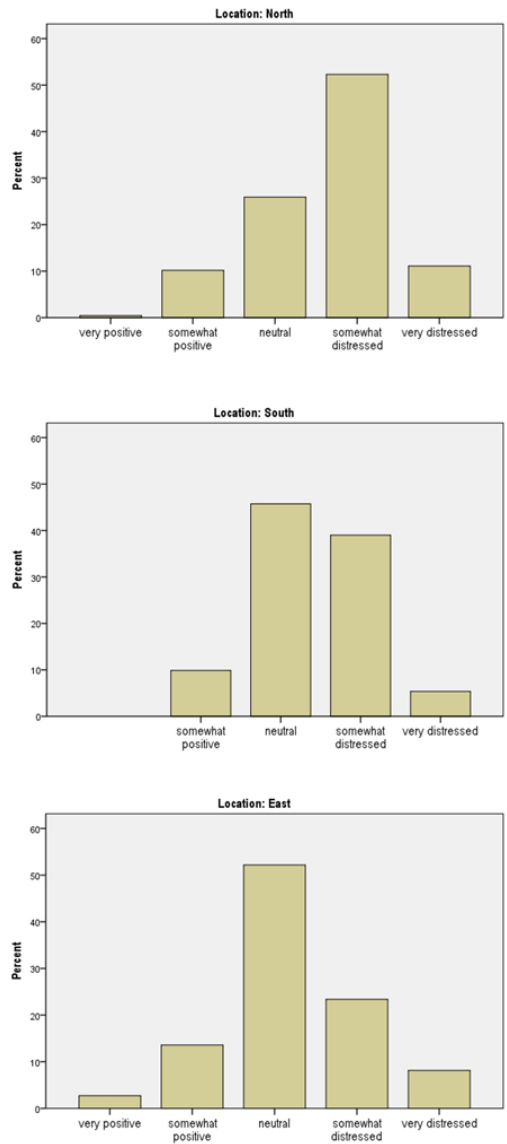
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Supplemental information 4: Existence and frequency of use of clinical guidelines (according to region)

90x108mm (300 x 300 DPI)

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Supplemental information 5. Emotional status of patients according to the specialist from north, south and eastern parts of Europe

38x90mm (300 x 300 DPI)

BMJ Open

Tinnitus healthcare: a survey revealing extensive variation in opinion and practices across Europe

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Primary Subject Heading:	Health services research
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Keywords:	Tinnitus, Health services evaluation, standard of care, Pan-European, Guidelines, Barriers

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Title page**Title:**

Tinnitus healthcare: a survey revealing extensive variation in opinion and practices across Europe

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Abstract:

Tinnitus remains a scientific and clinical problem whereby, in spite of increasing knowledge on effective treatment and management for tinnitus, very little impact on clinical practice has been observed. There is evidence that prolonged, obscure, and indirect referral-trajectories persist in usual tinnitus care.

Objective: It is widely acknowledged that efforts to change professional practice are more successful if barriers are identified and implementation activities are systematically tailored to the specific determinants of practice. The aim of this study was to administer a health-service evaluation survey to scope current practice- and knowledge of standards in tinnitus care across Europe. The purpose of this survey was to specifically inform the development-process of a European clinical guideline that would be implementable in all European countries.

Design: A health-services evaluation survey was carried out

Setting: The survey was carried out online across Europe

Participants: Clinical experts, researchers and policy makers involved in national tinnitus healthcare and decision making

Outcome measures: A survey was developed by the study steering group, piloted on clinicians from the TINNET network, and underwent two iterations before being finalized. The survey was then administered to clinicians and policy makers from 24 European countries.

Results: Data collected from 625 respondents revealed significant differences in national healthcare structures, use of tinnitus-definitions, opinions on characteristics of tinnitus-patients, assessment procedures, and particularly in available treatment options. Differences between northern and eastern European countries were most notable.

Conclusions: Most European countries do not have national clinical guidelines for the management of tinnitus. Reflective of this, clinical practices in tinnitus healthcare vary dramatically across countries. This equates to inequities of care for people with tinnitus across Europe and an opportunity to introduce standards in the form of a European clinical guideline. This survey has highlighted important barriers and facilitators to implementation of such a guideline.

Keywords: Tinnitus, health-service evaluation, Standard of care, Pan-European, Guidelines, Barriers, Facilitators

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For peer review only

Article Summary

Strengths & Limitations of this study

Strengths:

- This is the first and only pan-European health-service evaluation to scope current practice- and knowledge of clinical standards in tinnitus healthcare, which offers valuable information for ongoing endeavors to develop multidisciplinary guidelines and a standard of tinnitus health-care across Europe.
- Results provide health service information and expert opinions on national healthcare structures, reflecting a truly pan-European point of view and based on the results we have succeeded in defining important barriers as well as facilitators to the development and implementation of a guideline that can serve the whole of Europe, by being meaningful and actionable, and offer advice and options for professionals in the field and the patients they care for.

Limitations:

- From the 24 countries who participated in the survey, some had many more respondents than others. Responses from Lithuania and the Czech Republic might have a strong influence on the eastern region data, because of the large number of respondents from these countries.
- Most respondents were otologists. The large (over)representation of this discipline might indicate that other disciplines are less involved in tinnitus health care and that current reports rely heavily on the clinical views and experiences of otologists and might not reflect views or opinions of professionals of other disciplines.
- Important to note is that the current findings do not necessarily indicate or reflect a right or wrong in the organisation of tinnitus healthcare. Current results are seen in the light of establishing potential facilitators and barriers

Introduction

Tinnitus, the perception of a phantom sound, is a widespread auditory symptom [1]. It can occur with several audiological and/or otological disorders, such as sensorineural hearing loss. In rare cases, tinnitus can be traced to an underlying pathology, though uniform aetiology remains undetermined [2]. Epidemiological findings are difficult to pool across studies due to differences in methodologies [3]. Nonetheless, assuming a conservative tinnitus prevalence of 10% (severe tinnitus of 1%), tinnitus affects more than 42 million European Union (EU) adults and is a severe problem by more than four million adults. According to data from two large cohorts from Wisconsin (USA), tinnitus prevalence is increasing over time (on average by 1.4% each 5-year birth cohort) [4]. Assuming this increase is linear and of similar magnitude, prevalence estimates will double by 2050.

Tinnitus is residing within and confined to the individual's subjective perceptual experience, not measurable or quantifiable by objective physical recordings, and furthermore very rarely traceable to disease, injury, or pathology in the brain or elsewhere. Even though knowledge on the pathophysiology of tinnitus has made some progress [5, 6] there is still little evidence for effective curative tinnitus treatments or licensed pharmacological therapy [7]. The Cochrane Library currently includes nine systematic reviews on different tinnitus treatments [8], all of which are reported to have little, if any, quality evidence [9]. Patients report difficulties in concentration, being anxious and distressed, difficulty sleeping, being interrupted in their daily tasks, and feeling helpless and despondent most of the time. A wide range of evidence corroborates the theory that cognitive misinterpretations, negative emotional reactivity, and dysfunctional attentional processes are of main importance to the severe tinnitus condition [10-20].

From a scientific and clinical perspective, the increased knowledge on treatment and management for tinnitus has had minimal impact on clinical practice [2]. There is evidence that prolonged, obscure and indirect referral-trajectories persist in usual tinnitus care [21]. Tinnitus is indeed a highly complex condition with a multifactorial origin. Heterogeneous patient-profiles lead to a lack of consensus on standard assessment and treatment approaches, which in turn again lead to increasing complaints, prolonged suffering, and endless referral trajectories, resulting in enormous psychological, societal, and economic burden [22].

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3 In 2014, the EU approved funding for a four-years COST Action (TINNET) to create a
4 pan-European tinnitus research network. TINNET's working group 1 (WG1) consists of clinical
5 and academic experts in tinnitus from across Europe whose joint objective is to develop
6 meaningful and actionable clinical guidelines for the assessment and treatment of tinnitus
7 patients, and to provide a consensus-based clinical definition and characterization of tinnitus¹.
8 Ultimately, a European multidisciplinary clinical guideline would be a first step towards a
9 common minimum standard of care for tinnitus patients across Europe [23]. To ensure from a
10 development perspective that a European guideline would become implementable, it became
11 essential to scope current existence and knowledge of standards in tinnitus care across the
12 continent. Without knowledge on the current 'state of the art' and standards in tinnitus healthcare,
13 a consensus-based, meaningful, and actionable guideline could not be ensured. It is widely
14 acknowledged that efforts to change professional practice are more successful if barriers are
15 identified and guidelines for implementation activities are systematically tailored to the specific
16 determinants of practice [24]. As such, a pan-European survey of clinicians and policy makers
17 was carried out to gain service information and expert opinions on national healthcare structures,
18 tinnitus-definition, general characteristics of tinnitus patients, and assessment and treatment
19 options.
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34 **Methods**

35 The method for scoping current knowledge, opinion, and practices in tinnitus care across Europe,
36 a web-based survey was developed by consensus of members within TINNET WG1.
37 Participation was on a voluntary basis and all data were submitted anonymously.
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43 *Survey development*

44 The survey was developed during three consecutive WG1 meetings. It was agreed that the survey
45 would be developed in the English language, since it was expected that most responders would be
46 able to understand English, irrespective of the country of origin. The development involved two
47 phases. First, based on their shared knowledge of tinnitus, nine members of the WG1 steering
48 group generated a list of domains of interest, formulated a set of questions for each domain, and
49 generated a set of response options for each question. This list of questions was subsequently
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56 ¹ <http://tinnet.tinnitusresearch.net/index.php/2015-10-29-10-22-16/wg-1-clinical>
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3 piloted in a larger group of WG1 members (n=81) via e-mail, and during a WG1 management
4 meeting. Consensus-rounds were used to either include or exclude items. The remaining survey
5 items were then re-disseminated to all WG1 members who had been involved in the development
6 and piloting stages with a request to provide comments on any necessary alterations, changes to
7 wording or response options, and for any general remarks. A final survey was agreed upon and
8 produced for online dissemination using Google-forms. The final survey contained items grouped
9 as (1) Demographics, (2) National healthcare structure, (3) Tinnitus-definitions and
10 characteristics of the tinnitus-patient, and (4) Management, treatment and diagnostics.
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18 *Participants*

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20 The recruitment targeted clinical experts, researchers and policy makers involved in national
21 tinnitus healthcare and decision making. A total of 625 participants were recruited using the
22 COST-TINNET network. Firstly, members of the management committee of TINNET were
23 contacted via e-mail with a link to the survey (Supplemental information 1 provides the questions
24 used in the survey) and were requested to forward the invitation to clinical experts, researchers,
25 and tinnitus- organizations in their respective countries (n=24; Table 1). Secondly, another round
26 of targeted dissemination was performed in July 2015, as at that time it was noted that there was a
27 lower response rate from some countries. The low response rate from Italy and Spain was
28 identified as being a language barrier and therefore the survey was translated by native-speaking
29 TINNET members and re-distributed in their national language. The reason for low responses
30 from other countries was not identified. The survey was open from January to October 2015.
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41 *Patient and Public Involvement*

42 The aim of the current study falls within the framework and main aims of the COST TINNET
43 project¹. The project, and in particular working-package 1, focussed on the objective “Clinical
44 and audiological assessment of tinnitus patients according to common standards”. The current
45 study was an essential step in the roadmap towards the aim of the project [25]. In the
46 development and execution of the TINNET project, patient-organisations throughout Europe
47 were consulted and were actively involved in several stages. In the current survey, no individual
48 patients were recruited, nor were they involved, since this study involved the evaluation of
49 health-services by clinicians, policy makers, and individual professional expert opinions on
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3 national healthcare structures. Results of the current study were disseminated to all existing
4 European patient organisations using a Delphi consensus methodology in the development of
5 harmonized and adaptive clinical European guidelines for tinnitus entitled "Multidisciplinary
6 European Guideline for Tinnitus: Diagnostics, Assessment and Treatment"[23]. These have been
7 presented to the scientific community as well as national patient organisation symposia.
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10 11 12 13 *Analyses*

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15 Results were first described and depicted descriptively. Because the number of responses from
16 each country differed, data were stratified according to whether the country was in northern
17 (higher income), southern (moderate income), or eastern (lower income) Europe (**Table 1**).
18 (Supplemental information 2 gives the average monthly net income per country and per region).
19 The rationale for this classification was that economic prosperity might lead to differences in
20 health-care for tinnitus patients, since lesser resources indicate lower availability of specialized
21 health-care. One-way ANOVA and regression analyses were performed to assess differences and
22 associations between variables in, northern, southern, and eastern countries. All analyses were
23 performed in IBM-SPSS version 23.
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31 32 **Results**

33 34 *Demographics*

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36 Survey responses (n=625) were received from participants across 24 countries (**Figure 1**) with a
37 large number of participants from Lithuania, Czech Republic, Portugal, and Spain. The mean age
38 of respondents was 43.9 years (SD=12.4), 49.7% were male and 50.3% were female.
39 Respondents were from many disciplines (**Figure 2**) and worked in public healthcare (n=291),
40 private healthcare (n=199), university (n=89) or other setting (n=48). Some respondents reported
41 more than one workplace (n=213).
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48 INSERT FIGURE 1 ABOUT HERE

49 INSERT FIGURE 2 ABOUT HERE

Table 1. Classification and percentage of respondents according to region; 1=North, 2=South, 3=East

Country	Region	n per country	n per region	Percentage of total
Region 1			216	34.6%
AUSTRIA	1	1		
BELGIUM	1	54		
DENMARK	1	14		
FINLAND	1	1		
FRANCE	1	39		
GERMANY	1	28		
NETHERLANDS	1	41		
SWEDEN	1	23		
SWITZERLAND	1	3		
UK	1	12		
Region 2			225	36.0%
CYPRUS	2	2		
GREECE	2	29		
ITALY	2	50		
ISRAEL	2	12		
MALTA	2	9		
PORTUGAL	2	64		
SPAIN	2	59		
Region 3			184	29.4%
ALBANIA	3	2		
CROATIA	3	2		
CZECH REPUBLIC	3	68		
LITHUANIA	3	82		
POLAND	3	19		
SERBIA	3	8		
SLOVENIA	3	3		
Total		625	625	100

National healthcare structure

Across all three regions of Europe, tinnitus healthcare is in most cases financed by national health insurances. This was particularly evident for eastern countries where 90.8% of respondents

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3 reported that their service is publicly funded. Privately funded treatment is most common in
4 southern Europe (48%) (Supplemental Information 3).
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8 The most common referral pathways as well as the description of services and patients status are
9 given in **Figure 3** and **Table 2** respectively. In taking a regional perspective, difference across
10 Europe became clear. Specialised tinnitus clinics (or teams) are perceived to be most present in
11 the Northern regions (more than 50% of respondents confirmed), where referral by ENT and/or
12 Audiology seems common. Whereas in Southern Europe many people appear to self-refer to
13 specialists, in Eastern Europe referral opinions vary or are less understood by respondents. More
14 northern European respondents reported having and using clinical guidelines (Supplemental
15 information 4) than respondents from southern or eastern Europe.
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30 *Tinnitus, definitions, and characteristics of the tinnitus-patient*

31 In all regions, more experts report that, in their opinion, tinnitus is either a peripheral or central
32 auditory symptom (**Table 2**). Still, more than 10% from all regions considered tinnitus a disease,
33 whether auditory or psychological. Differences were found between higher and lower income
34 regions with respect to the perceived emotional status of their ‘typical’ patients (**Table 2**) and the
35 time spent with individual patients during the first consultation (**Table 3**). The majority of
36 respondents from northern Europe (41.7%) reported spending between 30-60minutes with
37 tinnitus patients on the first appointment, in contrast to 43.9% in the south and 56% in the east
38 spending between 15-30 minutes. Patients in northern Europe were evaluated as being more often
39 “somewhat distressed” in comparison to a more “neutral” status in the south and east (see also
40 Supplemental information 5).
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Table 2. View of 'Tinnitus' and emotional status of patients, classified according to region

	North		South		East		Sign.
	N	%	N	%	N	%	
What Is Tinnitus?							
A central auditory disease	8	3,7	9	4,0	17	9,2	
A central auditory symptom	88	40,7	64	28,4	37	20,1	
A peripheral auditory disease	11	5,1	17	7,6	12	6,5	
A peripheral auditory symptom	100	46,3	126	56,0	110	59,8	
A psychological disease	4	1,9	1	0,4	5	2,7	
Combination/ Multiple causes/ Other	5	2,3	6	2,7	3	1,6	
Cannot answer/does not know			2	0,9			
Chronic or acute?							n.s.
Chronic (>3months)	123	56,9	144	64,6	104	56,5	
Acute (<3months)	19	8,8	18	8,1	27	14,7	
Both	74	34,3	61	27,4	53	28,8	
Emotional status most patients?							**
Very positive	1	0,5	0	0	5	2,7	
Somewhat positive	22	10,2	22	9,9	25	13,6	
Neutral	56	25,9	102	45,7	96	52,2	
Somewhat distressed	113	52,3	87	39,0	43	23,4	
Very distressed	24	11,1	12	5,4	15	8,2	

* Different between all groups ($\alpha < .05$)

**Difference between North compared to South and East ($\alpha < .05$)

n.s.: Not significant; Sign: Significant difference

Table 3. Appointment duration and number of patients per month, classified according to region

	North		South		East		Sign. *
	N	Percent	N	Percent	N	Percent	
Duration of the 1st consultation							
less than 15 minutes	23	10,6	37	16,6	55	29,9	
15 to 30 minutes	51	23,6	98	43,9	103	56,0	
30 to 60 minutes	90	41,7	58	26,0	21	11,4	
60 to 120 minutes	44	20,4	25	11,2	5	2,7	
more than 120 minutes	8	3,7	5	2,2	0	0	
Number of patients per month	N	Percent	N	Percent	N	Percent	*
≤10	73	33,8	117	52,2	101	54,9	
11-30	96	44,4	87	38,8	61	33,2	
31-50	33	15,3	12	5,4	9	4,9	
> 50	14	6,5	8	3,6	13	7,1	

* Different between all groups ($\alpha < .05$)

**Difference between North compared to South and East ($\alpha < .05$)

n.s.: Not significant; Sign: Significant difference

Management, treatment, and diagnostics

All treatments available within their respective departments were reported (**Table 4**). Where medication was selected as an available option, the respondents were asked to indicate the specific drug in the 'other' free-text space. Here sound therapy is taken to include the use of hearing aids, and TRT includes any reportedly modified version of the treatment.

Medications used in tinnitus treatment included betahistine, steroids, vasodilators, antidepressants, and anxiolytics. 'Other' treatment options reported as available were hyperbaric chamber therapy, laser therapy, transcranial direct current stimulation, Gingko biloba, Vitamin B12, hypnosis, sleep hygiene, osteopathy, cochlear implantation, and music therapy. Differences in treatment availability across regions were striking, particularly between the north and east. Indicative of the general trends, CBT was available from 34.3% of departments in northern Europe, compared to just 4.9% in the east. In contrast, medication was an option in 79.9% of the departments in the east, whereas only 27.3% used medications in the north. While medication

was the most commonly available treatment option in the east, in both the north and south it was sound-based therapy (in 69.9% and 68.4% of departments respectively).

Table 4. Treatments reported as available within respondents departments, reported by region.

	North (n)	%	South (n)	%	East (n)	%
Advice	2	0	0	0	0	0
Alternative therapies	16	7.5	33	14.7	19	10.3
CBT	74	34.3	35	15.6	9	4.9
Counselling	108	50	115	51.1	41	22.3
Coping training	0	0	0	0	0	0
Dental procedure	2	0.9	0	0	0	0
Medication	59	27.3	111	49.3	147	79.9
Mindfulness	5	2.3	0	0	0	0
Neurofeedback	16	7.4	13	5.8	9	4.9
Physiotherapy	52	24.1	27	12	59	32.1
Relaxation	108	50	71	31.6	34	18.5
rTMS	14	6.5	3	1.3	3	1.6
Sound therapy	151	69.9	154	68.4	49	26.6
TRT	1	0.5	69	30.7	29	15.8

Clinicians involved in tinnitus care ranged from just one discipline to a broad multidisciplinary team (**Table 5**). Multidisciplinary treatments (MDT) and having a psychologist in the team was more common in northern countries than in the east and south. In the east, most care appears to be delivered by medical professionals (otolaryngologists or neurologists). Other disciplines involved in tinnitus care, reported by 1-2% of respondents, included prosthetists, social workers, movement therapists, osteopaths, sophrologists, psychosomatic medicine specialists, acupuncturists, hearing therapists, ophthalmologist, dance movement therapists, general practitioners, cardiologists, maxillofacial surgeons, and radiologists. There were single reports of

an arts therapist, counsellor, speech therapist, mindfulness instructor, and hypnotherapist being involved in care.

Table 5. Disciplines involved in tinnitus care

	North	percent	South	percent	East	percent
ENT	118	54.6	43	19.1	87	47.3
Audiologist	132	61.1	39	17.3	57	31
Psychologist	136	63	32	14.2	24	13
Psychiatrist	33	15.3	39	17.3	39	21.2
Physiotherapist	19	8.8	3	1.3	3	1.6
Neurologist	20	9.3	19	8.4	81	44
Dentist	3	1.4	1	0.4	0	0

Conditions and or symptoms perceived as being of relevance when assessing and/or treating tinnitus are given in **Table 6**. Most respondents reported hearing loss and dizziness complaints as relevant, irrespective of the region.

Other conditions frequently reported by respondents as of relevance to tinnitus were suicidal tendency, otitis, eustachian tube dysfunction, acoustic neuroma, multiple sclerosis, and coagulation disorder. A minority ($\leq 1\%$) additionally reported hyperacusis, autoimmune disease, neurovascular conflict, Pendred syndrome, stress, psychosis, nasal septal deformation, vascular disease, facial pain, sensory hypersensitivity, cardiac arrhythmia, arterial stenosis, sleep disorders, hypercholesterolemia, fibromyalgia, apnoea, and rhinosinusitis.

Table 6. Opinions on which conditions are taken into consideration in tinnitus diagnostics

	North	percent	South	percent	East	percent
Hypertension	98	45.4	118	52.4	79	42.9
Diabetes	45	20.8	108	48	55	29.9
Thyroid dysfunction	0	0	1	0.4	0	0
TMJ disorders	92	42.6	125	55.6	28	15.2
Psychological/psychiatric disorders	155	71.8	163	72.4	73	39.7
Hearing loss	212	98.1	221	98.2	159	86.4
Hyperlipidaemia	16	7.4	61	27.1	31	16.8
Dizziness	191	88.4	200	88.9	161	87.5
Cervical disorders	100	46.3	98	43.6	94	51.1
Migraine	72	33.3	83	36.9	41	22.3
Allergy	21	9.7	35	15.6	11	6

There was a general consensus on the diagnostic tools to be used to assess tinnitus patients in clinical practice (**Table 7**). Most respondents reported that otoscopy and pure tone audiometry were used. There was some variability in the reported use of other diagnostic tools, e.g. percentage use of audiological assessments such as tympanometry or speech audiometry in the north was twice that in the east. ‘Other’ responses included clinical interview, Diagnostic and Statistical Manual of Mental Disorders, vestibular evoked myogenic potential, brainstem evoked response audiometry, tone decay, neck vessel ultrasonography, orthopantomography, blood analysis, vestibular testing (calorimetry), blood pressure, and auditory brainstem response, all of which were reported by $\leq 3\%$ of respondents.

Table 7. Diagnostic tools used with tinnitus patients

	North	percent	South	percent	East	percent
Otoscopy	169	78.2	211	93.8	135	73.4
Tympanometry	142	65.7	172	76.4	56	30.4
Nasal endoscopy	37	17.1	87	38.7	147	79.9
Pure tone audiometry	162	75	186	82.7	151	82.1
High frequency audiometry	64	29.6	48	21.3	27	14.7
Speech audiometry	119	55.1	93	41.3	44	23.9
Tinnitus pitch and loudness	95	44	86	38.2	46	25
LDL	2	0.9	1	0.4	0	0
LMM	1	0.5	0	0	0	0
IR	1	0.5	0	0	0	0
Broadband noise EP	0	0	0	0	0	0
Pure tone EP	0	0	0	0	0	0
(DP)OAE	68	31.5	54	24	35	19
AC-ASSR	9	4.2	18	8	4	2.2
EEG	14	6.5	3	1.3	16	8.7
CT	17	7.9	34	15.1	44	23.9
MRI	76	35.2	119	52.9	100	54.3
Angio-MRI	28	13	37	16.4	19	10.3

Most respondents from northern and southern countries reported using some form of multi-item questionnaire, in comparison with only about one in five respondents from eastern European countries (**Figure 4**). In eastern countries, the use of these measures is much less common. The most frequently used questionnaire, irrespective of region was the Tinnitus Handicap Inventory (THI) [26]. Interestingly, the only anxiety/depression questionnaire used was the Hospital Anxiety and Depression Scale (HADS) [27] and this in Eastern countries. The Tinnitus Questionnaire (TQ) [28] was mentioned frequently in northern and southern regions. The more recently developed Tinnitus Functional Index (TFI) [29] was only mentioned in the North. Additionally, respondents from all regions specified to use visual analogue scales (though unspecified which) as well. Questionnaires reported as ‘other’ were unspecified.

INSERT FIGURE 4 ABOUT HERE

Finally, regarding the satisfaction rate on the service provided by their health care unit, 81.7% respondents from the north, 38.5% from the South, and 35.0% from the east reported they were.

In northern Europe professionals were largely satisfied, whereas in southern and eastern Europe opinions were more divided, and less than half of respondents claimed to be satisfied.

Regression analyses

Regression analyses were conducted to establish whether there were statistically significant associations between average net income of the country of origin of respondents and the presence of specialised tinnitus-clinics, time for tinnitus-patients per consult, satisfaction of the respondent with their service, number of patients seen per month, the requirement of a referral by GP in their country, and whether or not clinical guidelines exist. Significant associations were found between net income per month and all variables in the model (**Table 8**). In summary, higher income was associated with more specialised clinics, longer appointment times, greater satisfaction with health-care options, fewer patients per month, more referral-necessity by GP, and more knowledge and use of clinical guidelines.

Table 8. Associations between income and tinnitus care. Regressions summary: Dependent = income, Independents = Specialised clinics present, time per consult, Satisfaction of respondent with healthcare, Patients seen per month, Necessity of referral by GP, Existence of clinical guidelines, controlled for age and gender.

Model	Change Statistics				Beta	Sig. F Change
	R Square Change	F Change	df1	df2		
Age / gender	0.007	1.989	2	605	-0.033	0.138
Specialised clinic	0.266	220.407	1	604	-0.516	0.000
Time per consult	0.106	102.780	1	603	0.334	0.000
Satisfaction healthcare	0.048	50.505	1	602	-0.235	0.000
Patients per month	0.015	15.728	1	601	0.124	0.000
GP necessary	0.010	10.507	1	600	-0.106	0.001
Clinical guidelines	0.008	9.272	1	599	0.094	0.002

Coding: Specialised clinic: Yes=0, No=1; Time per consult: 1=< 15 min, 2=15-30min, 3=30-60min, 4=60-12min, 5=>120min; Satisfaction healthcare: Yes=0, No=1; GP necessary: Yes=0, No=1; Clinical guidelines: Yes=0, No=1. Dependent: income

Discussion

This survey sought to collate details and opinions on healthcare structure and clinical practices for tinnitus across Europe. The first interesting result from the survey was the difference between regions of Europe in terms of whether specialist tinnitus clinics are present. In the northern countries of Europe, most respondents confirmed the presence of specialised tinnitus clinics, in the South about half confirmed having specialist centres, and in the East most respondents reported not having specialised clinics. That there seems to be discord in knowledge or opinions in the rest of Europe is interesting. Where there are indeed specialised clinics, which professionals are aware of, they might more easily refer patients to these clinics without the need for a GP. On the other hand, when fewer clinics are present or known, tinnitus care more often falls to the GP, who might refer to a specialist, but not necessarily to a specialised centre. Opinions differ on whether a referral from a GP is necessary; the majority of respondents from Eastern Europe reported that it is indeed the case, whereas in northern and southern Europe less than half of respondents thought so. These findings indicate the importance of knowing the referral path. Addressing the lack of clinician's knowledge is key in the development of meaningful and actionable European guidelines. The lack of knowledge of existing specialised clinics also points to difficulties patients are likely to encounter in identifying the most appropriate healthcare. An uncertain healthcare journey and the lack of clear referral pathways is likely to exacerbate ongoing tinnitus distress, severity and chronicity.

In terms of national healthcare structure, the typical pathways differ by region. In the north they most commonly include specialised audiologists and otolaryngologists, who can presumably refer onto specialist centres where available. In southern Europe it was more common that people self-refer for tinnitus care. In Eastern Europe referral pathways were either less understood or less well-defined.

When asked which disciplines usually 'handle' tinnitus patients, the mix of disciplines reported was more evenly distributed across the counselling and medical professions in northern countries than other regions, i.e. tinnitus care was not more associated with one type of healthcare professional than another. In contrast, in southern and eastern countries it is reported that medical and technical professionals are most commonly involved. Interestingly this indicates a tendency

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3 towards a 'psychological' approach in the north compared to a more curative approach in tinnitus
4 treatment in the other regions. Since there is ample evidence that psychological therapy is
5 beneficial in any tinnitus treatment approach, and that there are regions in Europe where this is
6 not provided, these findings highlight a *second barrier* in to the adoption and implementation of a
7 Europe wide practice guideline.
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13 In all regions, opinions varied on whether tinnitus is a peripheral or central auditory symptom or
14 condition. This data will be useful in achieving a consensus definition of tinnitus within a
15 European guideline. Interestingly, respondents from northern countries more often reported their
16 average patients to be distressed, whereas most respondents from the south and east judged their
17 patients to be neither distressed nor 'positive' but to be of a 'neutral' emotional status. This could
18 indicate that in the north, the range of patients that are seen by experts is broader, i.e. patients
19 with milder as well as more severe tinnitus are assessed by specialists. It is also possible that
20 since northern countries dedicate more time per patient, physicians are more able to assess levels
21 of distress. It might also reflect a greater awareness of the emotional distress of patients since in
22 the north, a psychological assessment including clinical questionnaires is more often conducted.
23 This is of interest because the level of distress of tinnitus patients is an important indicator of the
24 need for onward referral for subsequent treatment options. A third barrier to the implementation
25 of a European guideline may therefore be that in most regions of Europe, professionals
26 responsible for tinnitus patients do not have a sufficient amount of time to adequately assess the
27 level of distress of their patients.
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41 The presence of a multidisciplinary treatment teams for tinnitus in northern regions was reported
42 in most cases, including a psychologist working in most teams. By region however, it is noted
43 that in the south many respondents report that there are no multidisciplinary treatment teams, and
44 in the east, there was almost no psychologists involved in treatment. These findings represent a
45 major fourth barrier in developing the development of meaningful and actionable European
46 guidelines, if the guideline is to include evidence-based healthcare.
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53 There is consensus across the regions on which conditions are important in tinnitus. Most
54 respondents, irrespective of region, reported hearing loss, acoustic trauma, and vertigo as the
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3 most relevant conditions to consider in the assessment of tinnitus. This consensus represents a
4 second facilitator in discussions on and implementation of European guidelines,
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8 The treatment options reported by respondents also showed clear trends according to region. This
9 finding can be classified as a *fifth barrier*, in that it might be difficult to get consensus on what
10 works for whom when many treatment avenues are preferentially made available. When
11 developing a guideline it is of importance to provide clear indications on which treatments are
12 recommended, which are not recommended, and which have insufficient evidence to make a
13 recommendation in either direction [30].
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20 There was consensus on the diagnostic tools to be used to assess tinnitus patients in clinical
21 practice. Although some small differences in procedures were reported, most experts use
22 otoscopy and pure tone audiometry. There is some variability in the use of other diagnostic tools
23 suggesting a potential third facilitator to discussions, on the inclusion of standardised diagnostic
24 procedure in the guidelines.
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30 A sixth barrier to standardised practice emerging from our data may be the limited use of clinical
31 questionnaires in eastern and southern countries. Yet consensus exists that in research as well as
32 the clinic questionnaires are key in assessment, both for screening and monitoring treatment
33 progress [2, 31]. The most commonly used questionnaire however, irrespective of region, was the
34 Tinnitus Handicap Inventory (THI). This finding is consistent with a previous study [32]. This
35 might offer a fourth facilitator to discussions, on primary outcome measures to recommend
36 within a guideline.
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44 When asked how patients pay for treatment, respondents from southern and eastern Europe
45 reported fewer patients pay privately for their tinnitus healthcare. Nonetheless, in all regions,
46 tinnitus treatments were financed by national health insurance schemes. This may become
47 restrictive if health insurance companies have a strong influence on what tinnitus treatment
48 options are made available within a country. When patients pay for treatment privately, more
49 treatment options might be on offer, even without adequate evidence of effectiveness. That there
50 are differences in how patients pay for treatment is a seventh barrier to standard care across
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3 Europe, and a difficult one. In cases where the regulatory bodies in health care in a country are
4 unwilling or unable to hold to the restrictions or recommendations stated in a guideline, the
5 chances of implementation of this guideline drastically decrease.
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10 Less than half of respondents from the south and east of Europe reported they were satisfied with
11 current tinnitus healthcare in their country. This dissatisfaction may represent a fifth facilitator in
12 that professionals are likely to be positive about progressive guidelines and towards changes in
13 healthcare for tinnitus.
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18 Finally, economic prosperity in a country often defines healthcare organization and healthcare
19 satisfaction [33]. In the current study, it was hypothesized that the economic resources available
20 to individuals in a country might dictate the view of professionals on levels of advancement in
21 healthcare for tinnitus. This was indeed the case. Lower average net income in the country of
22 origin of respondents was associated with reports of fewer specialized tinnitus healthcare; fewer
23 specialised tinnitus-clinics, less time for tinnitus-patients per consult, and more often a lack (or
24 use) of guidelines. Lower average income was also associated with lower satisfaction of the
25 respondent with healthcare, and more necessity of referral by a GP. Interestingly, higher average
26 net income in a country was associated with seeing more patients per month.
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36 Some additional points are worthy of discussion. First, from the 24 countries who participated in
37 the survey, some had many more respondents than others. This issue was presently solved by
38 stratifying the countries according to region of Europe to yield similar respondent numbers per
39 region. Nevertheless, responses from Lithuania and the Czech Republic might have a strong
40 influence on the eastern region data, because of the large number of respondents from these
41 countries. Second, most respondents were otologists. The large (over)representation of this
42 discipline might indicate that other disciplines are less involved in tinnitus health care, and that
43 current reports rely heavily on the clinical views and experiences of otologists and might not
44 reflect views or opinions of professionals of other disciplines. Third, it is important to note that
45 the current findings do not necessarily indicate or reflect a right or wrong in the organisation of
46 tinnitus healthcare, the available assessment and treatment options for tinnitus in a country, or the
47 advancement of specialised healthcare in a country. It is important that the current results are
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seen in the light of establishing potential facilitators and barriers (see Box 1 below for summary) to the development and implementation of a guideline that can serve the whole of Europe, by being meaningful and actionable, and offer advice and options for professionals in the field, and the patients they care for.

BOX 1: Summary of Barriers and Facilitators	
Barriers	
1	Lack of knowledge about or non-existence of specialised tinnitus clinics or teams makes it difficult for tinnitus patients to find their way to the most appropriate professionals in a country.
2	Lack of time or other resources for adequate counselling
3	Lack of time or other resources for professionals responsible for tinnitus patients to be able to adequately assess the distress-level of tinnitus patients
4	Lack of multidisciplinary teams, and/or availability of psychologists in southern and eastern European countries
5	High variation in available treatment options; more medical-pharmacological treatment in southern and eastern countries. psychological-rehabilitative approaches more available in northern countries. When many treatment avenues are considered viable it may be difficult to reach consensus on what works for whom
6	The use of self-report instruments is much less common in southern and eastern countries
7	There are differences in how patients pay for treatment. If regulatory bodies in healthcare in a country are unwilling or unable to hold to the restrictions or recommendations stated in a guideline, the likelihood of implementation of this guideline is lower.
Facilitators	
1	Common ground in expert-opinion that tinnitus is a central auditory symptom. This offers options for discussions on the definition of tinnitus in a European guideline
2	Consensus across regions on what conditions are relevant or associated with tinnitus. Harmonies such as these are to be highlighted where possible to facilitate implementation of a standard guideline
3	Though some small differences in procedures were reported, most experts use otoscopy and pure tone audiometry. Findings will facilitate discussions on diagnostics to include in the guidelines
4	The most commonly used questionnaire irrespective of region is the Tinnitus Handicap Inventory. This may facilitate discussions on assessment methods to recommend within a guideline
5	The percentage of respondents satisfied with current tinnitus healthcare in their country in southern and eastern Europe was low; less than half of respondents reported they were satisfied. Healthcare professionals are likely to be positive towards progressive guidelines and towards changes in health care for tinnitus.

Contributorship statement

RC wrote the first draft of the manuscript and performed the statistical analyses. DK and TB developed and designed the online questionnaire and performed preliminary analyses. DH provided extensive feedback on the initial draft and cowrote further versions of the manuscript. All remaining authors (BM, HH, CC, AN, AL, TB) provided feedback and offered critical analyses of the main text and results on all drafts of the manuscript.

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Competing Interests

All authors have declared that there are no competing interests

Data are available upon reasonable request

Deidentified participant data will be made available through corresponding author

Figure captions & Legends

- FIGURE 1. Responses from each participating country
- FIGURE 2. Discipline of respondents
- FIGURE 3: Most common referrals according to region
- FIGURE 4. Main questionnaire used per region

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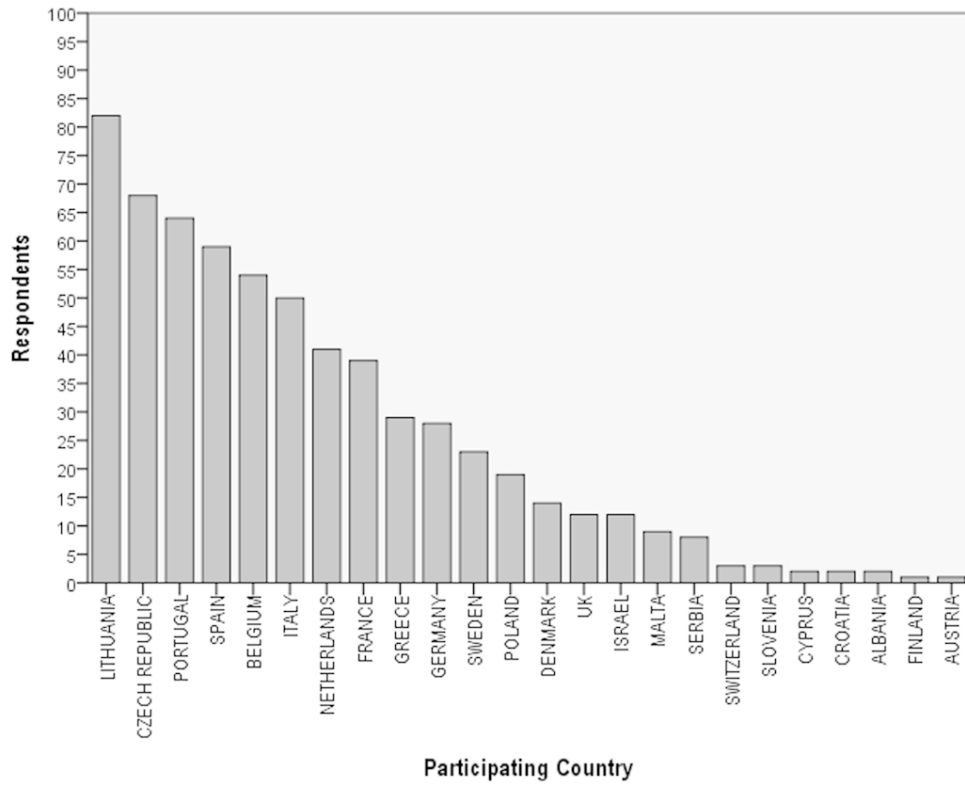


Figure 1. Responses from each participating country

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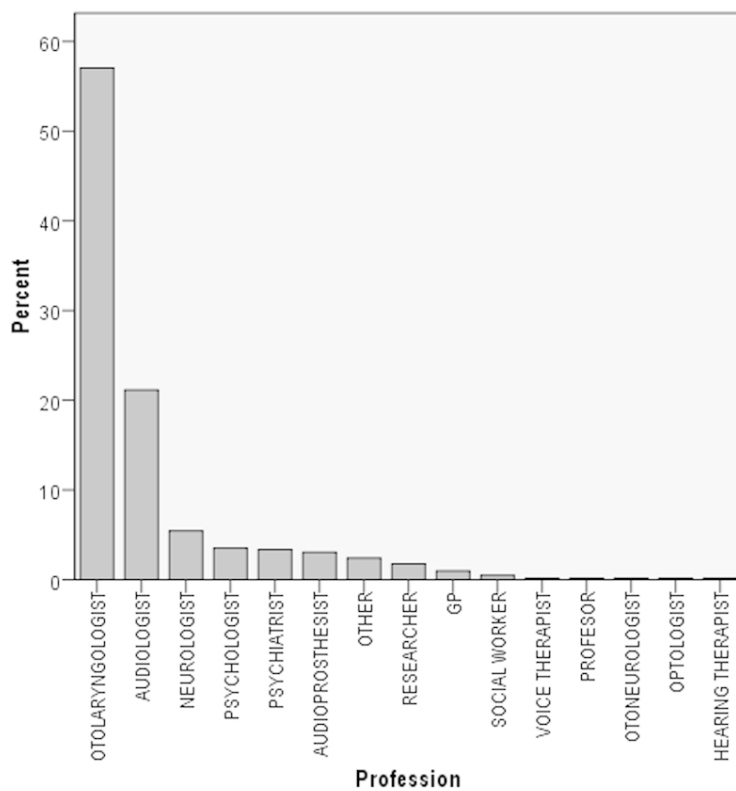
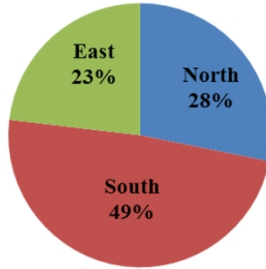


Figure 2. Discipline of respondents

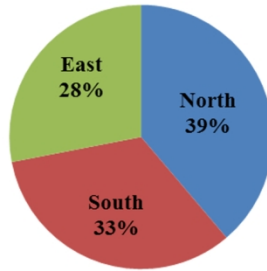
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Self-referral most common



Referral by ENT most common



Referral by Audiology most common

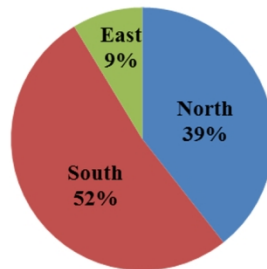


Figure 3. Most common referrals according to region

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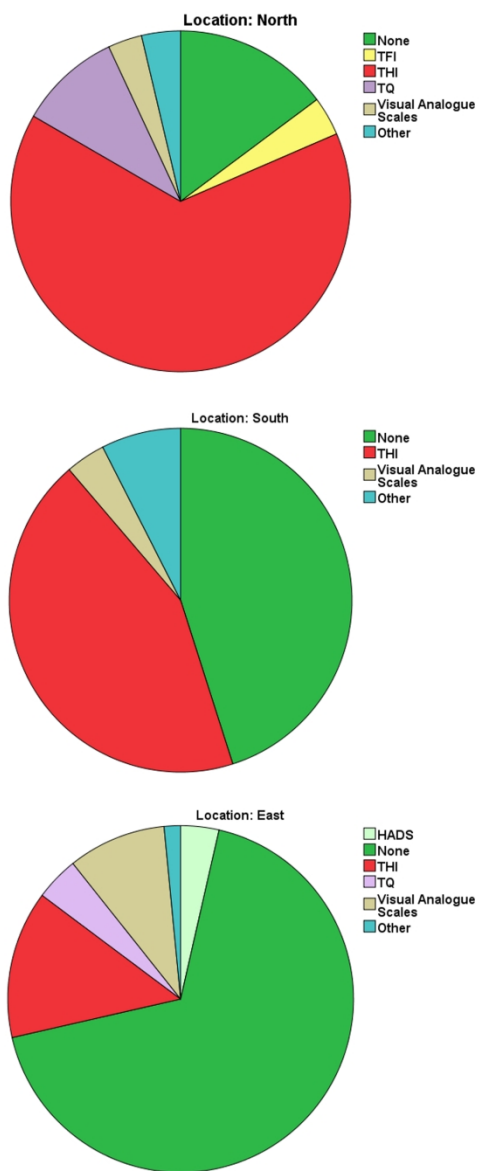


Figure 4. Main questionnaire used per region

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Supplemental information 1: The survey

DEMOGRAPHICS
<p>1. Age</p> <p>2. Gender</p> <p>3. In which country do you reside?</p> <p>4. What is your profession? (Multiple choice). Options: GP, ENT, psychologist, psychiatrist, neurologist, audiologist, other, namely...</p> <p>5. Where do you work? (Multiple choice). Options: Public hospital, private hospital, university, university hospital, private office/practice, other, namely...</p>
NATIONAL HEALTH-CARE STRUCTURE
<p>6. Are there specialized tinnitus healthcare-units in your country? (yes/no)</p> <p>7. What referral pathways for tinnitus patients are typically used in your country? (Multiple choice). Options: GP, ENT, Internet, directly, hospital, psychologist, dentist, community services, other, namely...</p> <p>8. Is a consultation with GP necessary to go to a tinnitus unit/clinic/ENT/Audiological centre? (yes/no)</p>
STATUS OF THE PATIENT
<p>9. Do you consider tinnitus to be...? (Multiple choice). Options: Symptom, disease, audiological problem, psychological problem, none of the above, other, namely...</p> <p>10. What is on average the emotional status of your patient at the moment of first consultation? (5-point Likert). Options: Very positive, somewhat positive, neutral, distressed, very distressed</p> <p>11. Do you see predominantly...? (Multiple choice). Options: Chronic tinnitus (more than 3 months), acute tinnitus (less than 3 months), both</p> <p>12. How much time can you allocate to an individual tinnitus patient in one consultation? (Multiple choice). Options: 1-10 min, 10-30 min, 30-60 min, More than 60 min</p> <p>13. How many tinnitus patients do you see in one week? (Multiple choice). Options: Less than 1, 1-5, 6-10, More than 10</p>
MANAGEMENT OF THE PATIENT
<p>14. Is there a protocol for tinnitus management in your country? (yes/no)</p> <p>b. If yes, how often do you use it? (5-point Likert). Options: Always, almost always, sometimes, almost never, never</p> <p>15. What disciplines most often handle tinnitus patients in your country? (Multiple choice). Options: ENT, audiology, psychology, psychiatry, physiotherapy, neurology, dentistry, other, namely...</p>

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6 16. Is there a multidisciplinary approach to treat the tinnitus patient? (yes/no)
7 b. If yes which professionals are included? (Multiple choice). Options: ENT, audiologist, psychologist,
8 psychiatrist, physiotherapist, neurologist, dentist, other, namely...
9
10 17. Which medical/psychiatric conditions are taken into consideration when examining tinnitus patients?
11 (Multiple choice). Options: Hypertension, diabetes, thyroid dysfunction, TMJ disorders,
12 psychological/psychiatric disorders, hearing loss, hyperlipidaemia, dizziness, cervical disorders, migraine,
13 allergy, other
14
15

16 TREATMENT AND DIAGNOSTICS

- 17
18 18. What kind of clinical department in your country treats tinnitus patients? (Multiple choice). Options:
19 ENT, audiology, psychology, psychiatry, physiotherapy, neurology, dentistry, other, namely...
20
21 19. What are the treatments options for tinnitus patients in your center? (Multiple choice). Options: TRT,
22 CBT, mindfulness, relaxation, coping training, counselling, medication, advise/counselling, alternative
23 therapies, sound therapy, rTMS, neurofeedback, physiotherapy, dental procedure, other
24
25 20. What diagnostic tools do you use on a tinnitus patient? (Multiple choice). Options: Questionnaires,
26 micro-otoscopy, tympanometry, nasal endoscopy, pure tone audiometry, high frequency audiometry (12,
27 16, 20 kHz), speech audiometry (hearing loss), tinnitus pitch and loudness – LDL – LMM – IR, broad
28 band noise EP, pure tone EP, (DP)OAE, air-conduction auditory steady-state responses (AC-ASSR),
29 EEG, CT, MRI, angio-MRI.
30
31 21. Which questionnaires do you use to assess tinnitus severity? (Multiple choice). Options: TQ, TRQ, TFI,
32 THI, TFI, TSCH, HADS, BDI, STAI, VAS scales, Grade from 1 to 10, other, namely
33
34 22. How do your patients pay for treatment? (Multiple choice). Options: Public health, health insurance,
35 privately, other, namely...
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37 23. Are you satisfied with the current service provided by your healthcare-unit? (yes/no)
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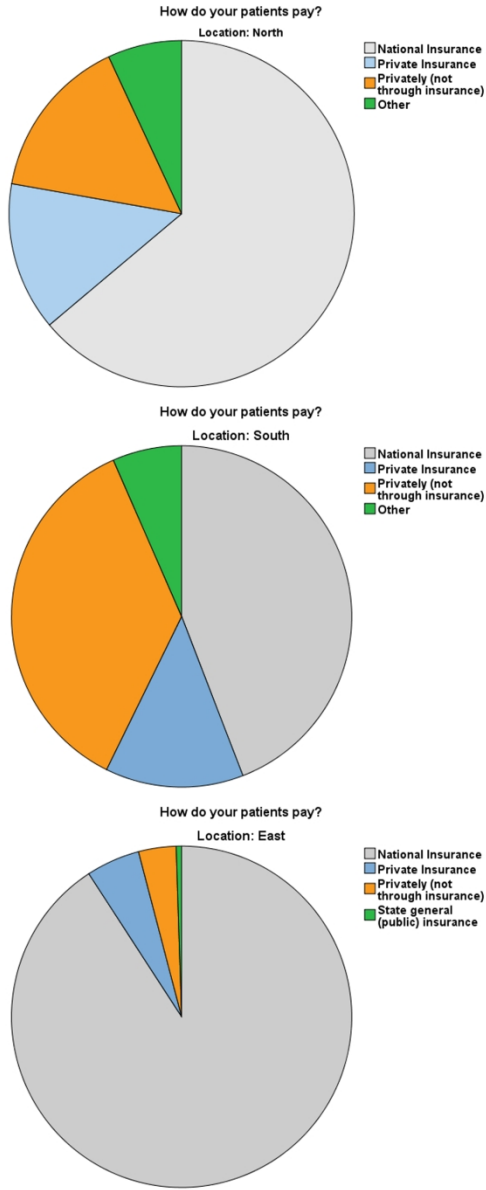
Supplemental Information 2: Average net monthly income per country and per region

n		Region	n	Percent	Income*
1	ALBANIA	3	2	0,3	370
2	AUSTRIA	1	1	0,2	2009
3	BELGIUM	1	54	8,6	2091
4	CROATIA	3	2	0,3	754
5	CYPRUS	2	2	0,3	1658
	CZECH				
6	REPUBLIC	3	68	10,9	772
7	DENMARK	1	14	2,2	3095
8	FINLAND	1	1	0,2	2509
9	FRANCE	1	39	6,2	2157
10	GERMANY	1	28	4,5	2265
11	GREECE	2	29	4,6	947
12	ISRAEL	2	12	1,9	1924
13	ITALY	2	50	8	1725
14	LITHUANIA	3	82	13,1	616
15	MALTA	2	9	1,4	1021
16	NETHERLANDS	1	41	6,6	2263
17	POLAND	3	19	3	677
18	PORTUGAL	2	64	10,2	984
19	SERBIA	3	8	1,3	377
20	SLOVENIA	3	3	0,5	692
21	SPAIN	2	59	9,4	1718
22	SWEDEN	1	23	3,7	2465
23	SWITZERLAND	1	3	0,5	4760
24	UK	1	12	1,9	2120
24	Total		625	100	

*Average net monthly income

Region	total	mean	n
1	25734	2573,40	10
2	9977	1425,29	7
3	4258	608,29	7

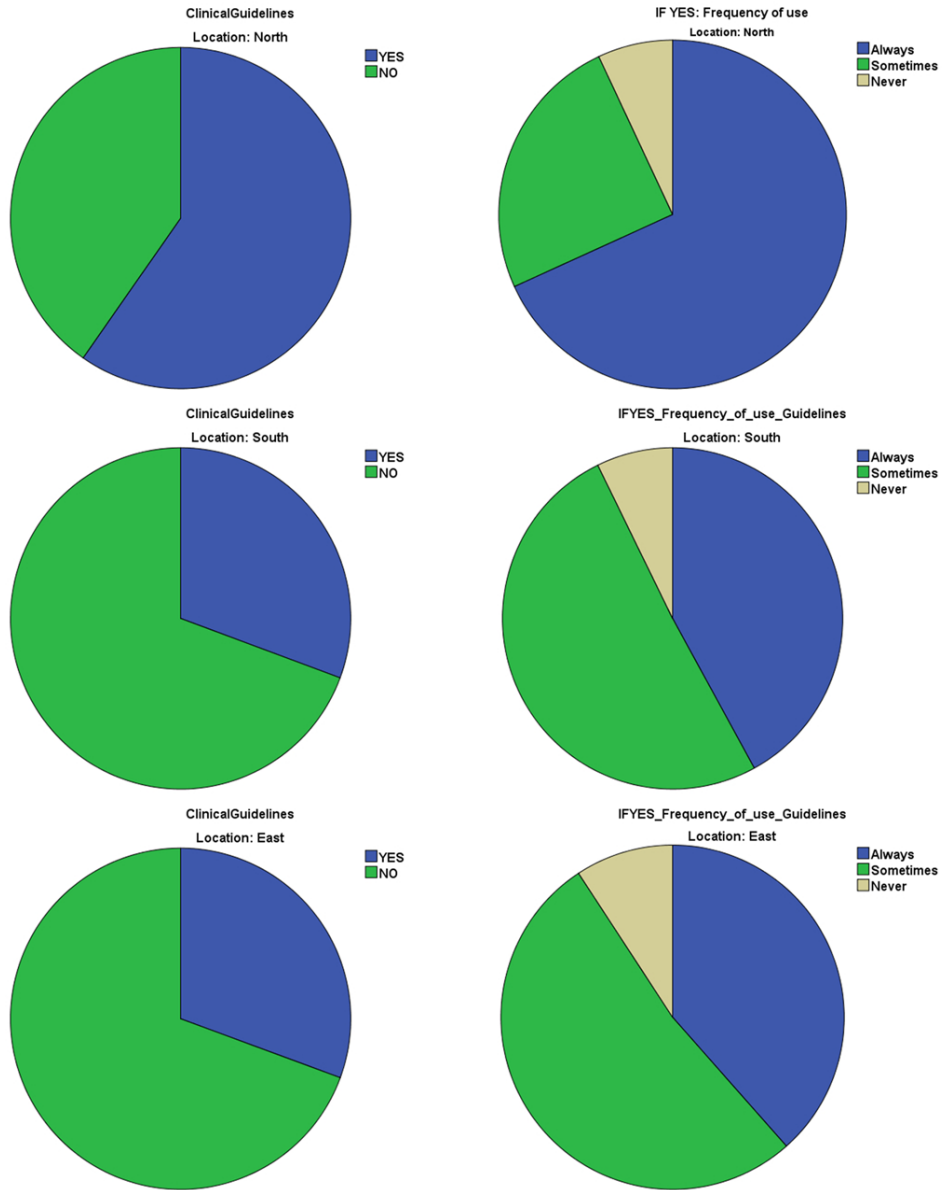
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Supplemental information 3: Financial reimbursement (payment methods) for tinnitus treatments per region

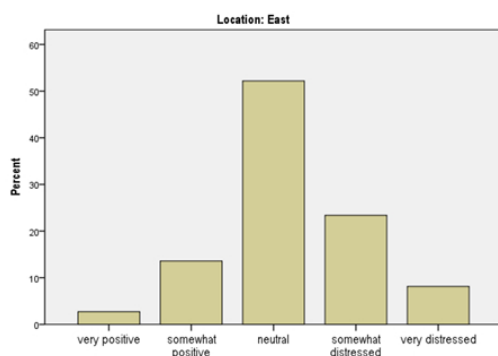
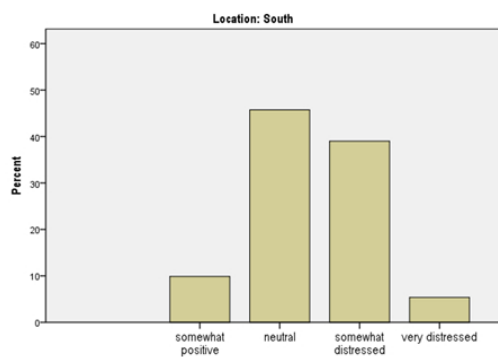
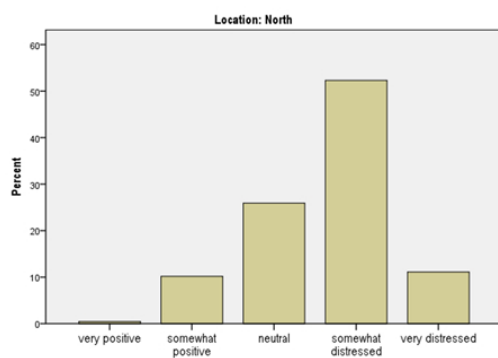
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Supplemental information 4: Existence and frequency of use of clinical guidelines (according to region)

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Supplemental information 5. Emotional status of patients according to the specialist from north, south and eastern parts of Europe

38x90mm (300 x 300 DPI)

BMJ Open

Tinnitus healthcare: a survey revealing extensive variation in opinion and practices across Europe

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Keywords:	Tinnitus, Health services evaluation, standard of care, Pan-European, Guidelines, Barriers

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Title page**Title:**

Tinnitus healthcare: a survey revealing extensive variation in opinion and practices across Europe

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Abstract:

Tinnitus remains a scientific and clinical problem whereby, in spite of increasing knowledge on effective treatment and management for tinnitus, very little impact on clinical practice has been observed. There is evidence that prolonged, obscure, and indirect referral-trajectories persist in usual tinnitus care.

Objective: It is widely acknowledged that efforts to change professional practice are more successful if barriers are identified and implementation activities are systematically tailored to the specific determinants of practice. The aim of this study was to administer a health-service evaluation survey to scope current practice- and knowledge of standards in tinnitus care across Europe. The purpose of this survey was to specifically inform the development-process of a European clinical guideline that would be implementable in all European countries.

Design: A health-services evaluation survey was carried out

Setting: The survey was carried out online accross Europe

Participants: Clinical experts, researchers and policy makers involved in national tinnitus healthcare and decision making

Outcome measures: A survey was developed by the study steering group, piloted on clinicians from the TINNET network, and underwent two iterations before being finalized. The survey was then administered to clinicians and policy makers from 24 European countries.

Results: Data collected from 625 respondents revealed significant differences in national healthcare structures, use of tinnitus-definitions, opinions on characteristics of tinnitus-patients, assessment procedures, and particularly in available treatment options. Differences between northern and eastern European countries were most notable.

Conclusions: Most European countries do not have national clinical guidelines for the management of tinnitus. Reflective of this, clinical practices in tinnitus healthcare vary dramatically across countries. This equates to inequities of care for people with tinnitus across Europe and an opportunity to introduce standards in the form of a European clinical guideline. This survey has highlighted important barriers and facilitators to implementation of such a guideline.

Keywords: Tinnitus, health-service evaluation, Standard of care, Pan-European, Guidelines, Barriers, Facilitators

Strengths & Limitations of this study

Strengths:

- This is the first and only pan-European health-service evaluation to scope current practice and clinical standards in tinnitus healthcare
- Results provide health service information and expert opinions on national healthcare structures, reflecting a truly pan-European point of view.
- Results define important barriers and facilitators to propel development and implementation of meaningful and actionable guidelines

Limitations:

- Two of the 24 countries who participated, had many more respondents than others, possibly influencing data excessively
- Most respondents were otologists, which might indicate lesser involvement of other disciplines in tinnitus health care at present and underrepresentation of viewpoints in results

Introduction

Tinnitus, the perception of a phantom sound, is a widespread auditory symptom [1]. It can occur with several audiological and/or otological disorders, such as sensorineural hearing loss. In rare cases, tinnitus can be traced to an underlying pathology, though uniform aetiology remains undetermined [2]. Epidemiological findings are difficult to pool across studies due to differences in methodologies [3]. Nonetheless, assuming a conservative tinnitus prevalence of 10% (severe tinnitus of 1%), tinnitus affects more than 42 million European Union (EU) adults and is a severe problem by more than four million adults. According to data from two large cohorts from Wisconsin (USA), tinnitus prevalence is increasing over time (on average by 1.4% each 5-year birth cohort) [4]. Assuming this increase is linear and of similar magnitude, prevalence estimates will double by 2050.

Tinnitus is residing within and confined to the individual's subjective perceptual experience, not measurable or quantifiable by objective physical recordings, and furthermore very rarely traceable to disease, injury, or pathology in the brain or elsewhere. Even though knowledge on the pathophysiology of tinnitus has made some progress [5, 6] there is still little evidence for effective curative tinnitus treatments or licensed pharmacological therapy [7]. The Cochrane Library currently includes nine systematic reviews on different tinnitus treatments [8], all of which are reported to have little, if any, quality evidence [9]. Patients report difficulties in concentration, being anxious and distressed, difficulty sleeping, being interrupted in their daily tasks, and feeling helpless and despondent most of the time. A wide range of evidence corroborates the theory that cognitive misinterpretations, negative emotional reactivity, and dysfunctional attentional processes are of main importance to the severe tinnitus condition [10-20].

From a scientific and clinical perspective, the increased knowledge on treatment and management for tinnitus has had minimal impact on clinical practice [2]. There is evidence that prolonged, obscure and indirect referral-trajectories persist in usual tinnitus care [21]. Tinnitus is indeed a highly complex condition with a multifactorial origin. Heterogeneous patient-profiles lead to a lack of consensus on standard assessment and treatment approaches, which in turn again lead to increasing complaints, prolonged suffering, and endless referral trajectories, resulting in enormous psychological, societal, and economic burden [22].

In 2014, the EU approved funding for a four-years COST Action (TINNET) to create a pan-European tinnitus research network. TINNET's working group 1 (WG1) consists of clinical and

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3 academic experts in tinnitus from across Europe whose joint objective is to develop meaningful
4 and actionable clinical guidelines for the assessment and treatment of tinnitus patients, and to
5 provide a consensus-based clinical definition and characterization of tinnitus¹. Ultimately, a
6 European multidisciplinary clinical guideline would be a first step towards a common minimum
7 standard of care for tinnitus patients across Europe [23]. To ensure from a development perspective
8 that a European guideline would become implementable, it became essential to scope current
9 existence and knowledge of standards in tinnitus care across the continent. Without knowledge on
10 the current 'state of the art' and standards in tinnitus healthcare, a consensus-based, meaningful,
11 and actionable guideline could not be ensured. It is widely acknowledged that efforts to change
12 professional practice are more successful if barriers are identified and guidelines for
13 implementation activities are systematically tailored to the specific determinants of practice [24].
14 As such, a pan-European survey of clinicians and policy makers was carried out to gain service
15 information and expert opinions on national healthcare structures, tinnitus-definition, general
16 characteristics of tinnitus patients, and assessment and treatment options.
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29 **Methods**

30 The method for scoping current knowledge, opinion, and practices in tinnitus care across Europe,
31 a web-based survey was developed by consensus of members within TINNET WG1. Participation
32 was on a voluntary basis and all data were submitted anonymously.
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38 *Survey development*

39 The survey was developed during three consecutive WG1 meetings. It was agreed that the survey
40 would be developed in the English language, since it was expected that most responders would be
41 able to understand English, irrespective of the country of origin. The development involved two
42 phases. First, based on their shared knowledge of tinnitus, nine members of the WG1 steering group
43 generated a list of domains of interest, formulated a set of questions for each domain, and generated
44 a set of response options for each question. This list of questions was subsequently piloted in a
45 larger group of WG1 members (n=81) via e-mail, and during a WG1 management meeting.
46 Consensus-rounds were used to either include or exclude items. The remaining survey items were
47 then re-disseminated to all WG1 members who had been involved in the development and piloting
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56 ¹ <http://tinnet.tinnitusresearch.net/index.php/2015-10-29-10-22-16/wg-1-clinical>
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3 stages with a request to provide comments on any necessary alterations, changes to wording or
4 response options, and for any general remarks. A final survey was agreed upon and produced for
5 online dissemination using Google-forms. The final survey contained items grouped as (1)
6 Demographics, (2) National healthcare structure, (3) Tinnitus-definitions and characteristics of the
7 tinnitus-patient, and (4) Management, treatment and diagnostics.
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13 *Participants*

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15 The recruitment targeted clinical experts, researchers and policy makers involved in national
16 tinnitus healthcare and decision making. A total of 625 participants were recruited using the COST-
17 TINNET network. Firstly, members of the management committee of TINNET were contacted via
18 e-mail with a link to the survey (Supplemental information 1 provides the questions used in the
19 survey) and were requested to forward the invitation to clinical experts, researchers, and tinnitus-
20 organizations in their respective countries (n=24; Table 1). Secondly, another round of targeted
21 dissemination was performed in July 2015, as at that time it was noted that there was a lower
22 response rate from some countries. The low response rate from Italy and Spain was identified as
23 being a language barrier and therefore the survey was translated by native-speaking TINNET
24 members and re-distributed in their national language. The reason for low responses from other
25 countries was not identified. The survey was open from January to October 2015.
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36 *Patient and Public Involvement*

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38 The aim of the current study falls within the framework and main aims of the COST TINNET
39 project¹. The project, and in particular working-package 1, focussed on the objective “Clinical and
40 audiological assessment of tinnitus patients according to common standards”. The current study
41 was an essential step in the roadmap towards the aim of the project [25]. In the development and
42 execution of the TINNET project, patient-organisations throughout Europe were consulted and
43 were actively involved in several stages. In the current survey, no individual patients were
44 recruited, nor were they involved, since this study involved the evaluation of health-services by
45 clinicians, policy makers, and individual professional expert opinions on national healthcare
46 structures. Results of the current study were disseminated to all existing European patient
47 organisations using a Delphi consensus methodology in the development of harmonized and
48 adaptive clinical European guidelines for tinnitus entitled "Multidisciplinary European Guideline
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3 for Tinnitus: Diagnostics, Assessment and Treatment"[23]. These have been presented to the
4 scientific community as well as national patient organisation symposia.
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10 *Analyses*

11 Results were first described and depicted descriptively. Because the number of responses from
12 each country differed, data were stratified according to whether the country was in northern (higher
13 income), southern (moderate income), or eastern (lower income) Europe (**Table 1**). (Supplemental
14 information 2 gives the average monthly net income per country and per region). The rationale for
15 this classification was that economic prosperity might lead to differences in health-care for tinnitus
16 patients, since lesser resources indicate lower availability of specialized health-care. One-way
17 ANOVA and regression analyses were performed to assess differences and associations between
18 variables in, northern, southern, and eastern countries. All analyses were performed in IBM-SPSS
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29 **Results**

30 *Demographics*

31 Survey responses (n=625) were received from participants across 24 countries (**Figure 1**) with a
32 large number of participants from Lithuania, Czech Republic, Portugal, and Spain. The mean age
33 of respondents was 43.9 years (SD=12.4), 49.7% were male and 50.3% were female. Respondents
34 were from many disciplines (**Figure 2**) and worked in public healthcare (n=291), private healthcare
35 (n=199), university (n=89) or other setting (n=48). Some respondents reported more than one
36 workplace (n=213).
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INSERT FIGURE 1 ABOUT HERE

INSERT FIGURE 2 ABOUT HERE

Table 1. Classification and percentage of respondents according to region; 1=North, 2=South, 3=East

Country	Region	n per country	n per region	Percentage of total
Region 1			216	34.6%
AUSTRIA	1	1		
BELGIUM	1	54		
DENMARK	1	14		
FINLAND	1	1		
FRANCE	1	39		
GERMANY	1	28		
NETHERLANDS	1	41		
SWEDEN	1	23		
SWITZERLAND	1	3		
UK	1	12		
Region 2			225	36.0%
CYPRUS	2	2		
GREECE	2	29		
ITALY	2	50		
ISRAEL	2	12		
MALTA	2	9		
PORTUGAL	2	64		
SPAIN	2	59		
Region 3			184	29.4%
ALBANIA	3	2		
CROATIA	3	2		
CZECH REPUBLIC	3	68		
LITHUANIA	3	82		
POLAND	3	19		
SERBIA	3	8		
SLOVENIA	3	3		
Total		625	625	100

National healthcare structure

Across all three regions of Europe, tinnitus healthcare is in most cases financed by national health insurances. This was particularly evident for eastern countries where 90.8% of respondents

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3 reported that their service is publicly funded. Privately funded treatment is most common in
4 southern Europe (48%) (Supplemental Information 3).
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8 The most common referral pathways as well as the description of services and patient's status are
9 given in **Figure 3** and **Table 2** respectively. In taking a regional perspective, difference across
10 Europe became clear. Specialised tinnitus clinics (or teams) are perceived to be most present in the
11 Northern regions (more than 50% of respondents confirmed), where referral by ENT and/or
12 Audiology seems common. Whereas in Southern Europe many people appear to self-refer to
13 specialists, in Eastern Europe referral opinions vary or are less understood by respondents. More
14 northern European respondents reported having and using clinical guidelines (Supplemental
15 information 4) than respondents from southern or eastern Europe.
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25 INSERT FIGURE 3 ABOUT HERE
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31 *Tinnitus, definitions, and characteristics of the tinnitus-patient*

32 In all regions, more experts report that, in their opinion, tinnitus is either a central auditory symptom
33 (**Table 2**). Still, more than 10% from all regions considered tinnitus a disease, whether auditory or
34 psychological. Differences were found between higher and lower income regions with respect to
35 the perceived emotional status of their 'typical' patients (**Table 2**) and the time spent with
36 individual patients during the first consultation (**Table 3**). The majority of respondents from
37 northern Europe (41.7%) reported spending between 30-60 minutes with tinnitus patients on the
38 first appointment, in contrast to 43.9% in the south and 56% in the east spending between 15-30
39 minutes. Patients in northern Europe were evaluated as being more often "somewhat distressed" in
40 comparison to a more "neutral" status in the south and east (see also Supplemental information 5).
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Table 2. View of ‘Tinnitus’ and emotional status of patients, classified according to region

	North		South		East		Sign.
	N	%	N	%	N	%	
What Is Tinnitus?							
A central auditory disease	8	3,7	9	4,0	17	9,2	
A central auditory symptom	88	40,7	64	28,4	37	20,1	
A peripheral auditory disease	11	5,1	17	7,6	12	6,5	
A peripheral auditory symptom	100	46,3	126	56,0	110	59,8	
A psychological disease	4	1,9	1	0,4	5	2,7	
Combination/ Multiple causes/ Other	5	2,3	6	2,7	3	1,6	
Cannot answer/does not know			2	0,9			
Chronic or acute?							n.s.
Chronic (>3months)	123	56,9	144	64,6	104	56,5	
Acute (<3months)	19	8,8	18	8,1	27	14,7	
Both	74	34,3	61	27,4	53	28,8	
Emotional status most patients?							**
Very positive	1	0,5	0	0	5	2,7	
Somewhat positive	22	10,2	22	9,9	25	13,6	
Neutral	56	25,9	102	45,7	96	52,2	
Somewhat distressed	113	52,3	87	39,0	43	23,4	
Very distressed	24	11,1	12	5,4	15	8,2	

* Different between all groups ($\alpha < .05$)

**Difference between North compared to South and East ($\alpha < .05$)

n.s.: Not significant; Sign: Significant difference

Table 3. Appointment duration and number of patients per month, classified according to region

	North		South		East		Sign. *
	N	Percent	N	Percent	N	Percent	
Duration of the 1st consultation							
less than 15 minutes	23	10,6	37	16,6	55	29,9	
15 to 30 minutes	51	23,6	98	43,9	103	56,0	
30 to 60 minutes	90	41,7	58	26,0	21	11,4	
60 to 120 minutes	44	20,4	25	11,2	5	2,7	
more than 120 minutes	8	3,7	5	2,2	0	0	
Number of patients per month	N	Percent	N	Percent	N	Percent	*
≤10	73	33,8	117	52,2	101	54,9	
11-30	96	44,4	87	38,8	61	33,2	
31-50	33	15,3	12	5,4	9	4,9	
> 50	14	6,5	8	3,6	13	7,1	

* Different between all groups ($\alpha < .05$)

**Difference between North compared to South and East ($\alpha < .05$)

n.s.: Not significant; Sign: Significant difference

Management, treatment, and diagnostics

All treatments available within their respective departments were reported (Table 4). Where medication was selected as an available option, the respondent were asked to indicate the specific drug in the 'other' free-text space. Here sound therapy is taken to include the use of hearing aids, and TRT includes any reportedly modified version of the treatment.

Medications used in tinnitus treatment included betahistine, steroids, vasodilators, antidepressants, and anxiolytics. 'Other' treatment options reported as available were hyperbaric chamber therapy, laser therapy, transcranial direct current stimulation, Gingko biloba, Vitamin B12, hypnosis, sleep hygiene, osteopathy, cochlear implantation, and music therapy. Differences in treatment availability across regions were striking, particularly between the north and east. Indicative of the general trends, CBT was available from 34.3% of departments in northern Europe, compared to just 4.9% in the east. In contrast, medication was an option in 79.9% of the departments in the east, whereas only 27.3% used medications in the north. While medication was the most commonly

available treatment option in the east, in both the north and south it was sound-based therapy (in 69.9% and 68.4% of departments respectively).

Table 4. Treatments reported as available within respondents departments, reported by region.

	North (n)	%	South (n)	%	East (n)	%
Advice	2	0	0	0	0	0
Alternative therapies	16	7.5	33	14.7	19	10.3
CBT	74	34.3	35	15.6	9	4.9
Counselling	108	50	115	51.1	41	22.3
Coping training	0	0	0	0	0	0
Dental procedure	2	0.9	0	0	0	0
Medication	59	27.3	111	49.3	147	79.9
Mindfulness	5	2.3	0	0	0	0
Neurofeedback	16	7.4	13	5.8	9	4.9
Physiotherapy	52	24.1	27	12	59	32.1
Relaxation	108	50	71	31.6	34	18.5
rTMS	14	6.5	3	1.3	3	1.6
Sound therapy	151	69.9	154	68.4	49	26.6
TRT	1	0.5	69	30.7	29	15.8

Clinicians involved in tinnitus care ranged from just one discipline to a broad multidisciplinary team (Table 5). Multidisciplinary treatments (MDT) and having a psychologist in the team was more common in northern countries than in the east and south. In the east, most care appears to be delivered by medical professionals (otolaryngologists or neurologists). Other disciplines involved in tinnitus care, reported by 1-2% of respondents, included prosthetists, social workers, movement therapists, osteopaths, sophrologists, psychosomatic medicine specialists, acupuncturists, hearing therapists, ophthalmologist, dance movement therapists, general practitioners, cardiologists,

maxillofacial surgeons, and radiologists. There were single reports of an arts therapist, counsellor, speech therapist, mindfulness instructor, and hypnotherapist being involved in care.

Table 5. Disciplines involved in tinnitus care

	North	percent	South	percent	East	percent
ENT	118	54.6	43	19.1	87	47.3
Audiologist	132	61.1	39	17.3	57	31
Psychologist	136	63	32	14.2	24	13
Psychiatrist	33	15.3	39	17.3	39	21.2
Physiotherapist	19	8.8	3	1.3	3	1.6
Neurologist	20	9.3	19	8.4	81	44
Dentist	3	1.4	1	0.4	0	0

Conditions and or symptoms perceived as being of relevance when assessing and/or treating tinnitus are given in **Table 6**. Most respondents reported hearing loss and dizziness complaints as relevant, irrespective of the region.

Other conditions frequently reported by respondents as of relevance to tinnitus were suicidal tendency, otitis, eustachian tube dysfunction, acoustic neuroma, multiple sclerosis, and coagulation disorder. A minority ($\leq 1\%$) additionally reported hyperacusis, autoimmune disease, neurovascular conflict, Pendred syndrome, stress, psychosis, nasal septal deformation, vascular disease, facial pain, sensory hypersensitivity, cardiac arrhythmia, arterial stenosis, sleep disorders, hypercholesterolemia, fibromyalgia, apnoea, and rhinosinusitis.

Table 6. Opinions on which conditions are taken into consideration in tinnitus diagnostics

	North	percent	South	percent	East	percent
Hypertension	98	45.4	118	52.4	79	42.9
Diabetes	45	20.8	108	48	55	29.9
Thyroid dysfunction	0	0	1	0.4	0	0
TMJ disorders	92	42.6	125	55.6	28	15.2
Psychological/psychiatric disorders	155	71.8	163	72.4	73	39.7
Hearing loss	212	98.1	221	98.2	159	86.4
Hyperlipidaemia	16	7.4	61	27.1	31	16.8
Dizziness	191	88.4	200	88.9	161	87.5
Cervical disorders	100	46.3	98	43.6	94	51.1
Migraine	72	33.3	83	36.9	41	22.3
Allergy	21	9.7	35	15.6	11	6

There was a general consensus on the diagnostic tools to be used to assess tinnitus patients in clinical practice (**Table 7**). Most respondents reported that otoscopy and pure tone audiometry were used. There was some variability in the reported use of other diagnostic tools, e.g. percentage use of audiological assessments such as tympanometry or speech audiometry in the north was twice that in the east. ‘Other’ responses included clinical interview, Diagnostic and Statistical Manual of Mental Disorders, vestibular evoked myogenic potential, brainstem evoked response audiometry, tone decay, neck vessel ultrasonography, orthopantomography, blood analysis, vestibular testing (calorimetry), blood pressure, and auditory brainstem response, all of which were reported by $\leq 3\%$ of respondents.

Table 7. Diagnostic tools used with tinnitus patients

	North	percent	South	percent	East	percent
Otoscopy	169	78.2	211	93.8	135	73.4
Tympanometry	142	65.7	172	76.4	56	30.4
Nasal endoscopy	37	17.1	87	38.7	147	79.9
Pure tone audiometry	162	75	186	82.7	151	82.1
High frequency audiometry	64	29.6	48	21.3	27	14.7
Speech audiometry	119	55.1	93	41.3	44	23.9
Tinnitus pitch and loudness	95	44	86	38.2	46	25
LDL	2	0.9	1	0.4	0	0
LMM	1	0.5	0	0	0	0
IR	1	0.5	0	0	0	0
Broadband noise EP	0	0	0	0	0	0
Pure tone EP	0	0	0	0	0	0
(DP)OAE	68	31.5	54	24	35	19
AC-ASSR	9	4.2	18	8	4	2.2
EEG	14	6.5	3	1.3	16	8.7
CT	17	7.9	34	15.1	44	23.9
MRI	76	35.2	119	52.9	100	54.3
Angio-MRI	28	13	37	16.4	19	10.3

Most respondents from northern and southern countries reported using some form of multi-item questionnaire, in comparison with only about one in five respondents from eastern European countries (**Figure 4**). In eastern countries, the use of these measures is much less common. The most frequently used questionnaire, irrespective of region was the Tinnitus Handicap Inventory (THI) [26]. Interestingly, the only anxiety/depression questionnaire used was the Hospital Anxiety and Depression Scale (HADS) [27] and this in Eastern countries. The Tinnitus Questionnaire (TQ) [28] was mentioned frequently in northern and southern regions. The more recently developed Tinnitus Functional Index (TFI) [29] was only mentioned in the North. Additionally, respondents from all regions specified to use visual analogue scales (though unspecified which) as well. Questionnaires reported as ‘other’ were unspecified.

INSERT FIGURE 4 ABOUT HERE

Finally, regarding the satisfaction rate on the service provided by their health care unit, 81.7% respondents from the north, 38.5% from the South, and 35.0% from the east reported they were. In northern Europe, professionals were largely satisfied, whereas in southern and Eastern Europe, opinions were more divided, and less than half of respondents claimed to be satisfied.

Regression analyses

Regression analyses were conducted to establish whether there were statistically significant associations between average net income of the country of origin of respondents and the presence of specialised tinnitus-clinics, time for tinnitus-patients per consult, satisfaction of the respondent with their service, number of patients seen per month, the requirement of a referral by GP in their country, and whether or not clinical guidelines exist. Significant associations were found between net income per month and all variables in the model (**Table 8**). In summary, higher income was associated with more specialised clinics, longer appointment times, greater satisfaction with health-care options, fewer patients per month, more referral-necessity by GP, and more knowledge and use of clinical guidelines.

Table 8. Associations between income and tinnitus care. Regressions summary: Dependent = income, Independents = Specialised clinics present, time per consult, Satisfaction of respondent with healthcare, Patients seen per month, Necessity of referral by GP, Existence of clinical guidelines, controlled for age and gender.

Model	Change Statistics				Beta	Sig. F Change
	R Square Change	F Change	df1	df2		
Age / gender	0.007	1.989	2	605	-0.033	0.138
Specialised clinic	0.266	220.407	1	604	-0.516	0.000
Time per consult	0.106	102.780	1	603	0.334	0.000
Satisfaction healthcare	0.048	50.505	1	602	-0.235	0.000
Patients per month	0.015	15.728	1	601	0.124	0.000
GP necessary	0.010	10.507	1	600	-0.106	0.001
Clinical guidelines	0.008	9.272	1	599	0.094	0.002

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3 *Coding: Specialised clinic: Yes=0, No=1; Time per consult: 1=< 15 min, 2=15-30min, 3=30-*
4 *60min,4=60-12min, 5=>120min; Satisfaction healthcare: Yes=0, No=1; GP necessary: Yes=0,*
5 *No=1; Clinical guidelines: Yes=0, No=1. Dependent: income*
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10 **Discussion**

11 This survey sought to collate details and opinions on healthcare structure and clinical practices for
12 tinnitus across Europe. The first interesting result from the survey was the difference between
13 regions of Europe in terms of whether specialist tinnitus clinics are present. In the northern
14 countries of Europe, most respondents confirmed the presence of specialised tinnitus clinics, in the
15 South about half confirmed having specialist centres, and in the East most respondents reported
16 not having specialised clinics. That there seems to be discord in knowledge or opinions in the rest
17 of Europe is interesting. Where there are indeed specialised clinics, which professionals are aware
18 of, they might more easily refer patients to these clinics without the need for a GP. On the other
19 hand, when fewer clinics are present or known, tinnitus care more often falls to the GP, who might
20 refer to a specialist, but not necessarily to a specialised centre. Opinions differ on whether a referral
21 from a GP is necessary; the majority of respondents from Eastern Europe reported that it is indeed
22 the case, whereas in northern and southern Europe less than half of respondents thought so. These
23 findings indicate the importance of knowing the referral path. Addressing the lack of clinician's
24 knowledge is key in the development of meaningful and actionable European guidelines. The lack
25 of knowledge of existing specialised clinics also points to difficulties patients are likely to
26 encounter in identifying the most appropriate healthcare. An uncertain healthcare journey and the
27 lack of clear referral pathways is likely to exacerbate ongoing tinnitus distress, severity and
28 chronicity.
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44 In terms of national healthcare structure, the typical pathways differ by region. In the north they
45 most commonly include specialised audiologists and otolaryngologists, who can presumably refer
46 onto specialist centres where available. In southern Europe it was more common that people self-
47 refer for tinnitus care. In Eastern Europe referral pathways were either less understood or less well-
48 defined.
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54 When asked which disciplines usually 'handle' tinnitus patients, the mix of disciplines reported
55 was more evenly distributed across the counselling and medical professions in northern countries
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3 than other regions, i.e. tinnitus care was not more associated with one type of healthcare
4 professional than another. In contrast, in southern and eastern countries it is reported that medical
5 and technical professionals are most commonly involved. Interestingly this indicates a tendency
6 towards a 'psychological' approach in the north compared to a more curative approach in tinnitus
7 treatment in the other regions. Since there is ample evidence that psychological therapy is
8 beneficial in any tinnitus treatment approach, and that there are regions in Europe where this is not
9 provided, these findings highlight a *second barrier* in to the adoption and implementation of a
10 Europe wide practice guideline.
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19 In all regions, most experts report that in their opinion tinnitus is a central auditory symptom, which
20 might indicate agreement between the regions, and offers a *first facilitator*. This data will be useful
21 in achieving a consensus definition of tinnitus within a European guideline. Interestingly,
22 respondents from northern countries more often reported their average patients to be distressed,
23 whereas most respondents from the south and east judged their patients to be neither distressed nor
24 'positive', but to be of a 'neutral' emotional status. This could indicate that in the north, the range
25 of patients that are seen by experts is broader, i.e. patients with milder as well as more severe
26 tinnitus are assessed by specialists. It is also possible that since northern countries dedicate more
27 time per patient, physicians are more able to assess levels of distress. It might also reflect a greater
28 awareness of the emotional distress of patients since in the north, a psychological assessment
29 including clinical questionnaires is more often conducted. This is of interest because the level of
30 distress of tinnitus patients is an important indicator of the need for onward referral for subsequent
31 treatment options. A third barrier to the implementation of a European guideline may therefore be
32 that in most regions of Europe, professionals responsible for tinnitus patients do not have a
33 sufficient amount of time to adequately assess the level of distress of their patients.
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46 The presence of a multidisciplinary treatment teams for tinnitus in northern regions was reported
47 in most cases, including a psychologist working in most teams. By region however, it is noted that
48 in the south many respondents report that there are no multidisciplinary treatment teams, and in the
49 east there was almost no psychologists involved in treatment. These findings represent a major
50 fourth barrier in developing the development of meaningful and actionable European guidelines, if
51 the guideline is to include evidence-based healthcare.
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5 There is consensus across the regions on which conditions are important in tinnitus. Most
6 respondents, irrespective of region, reported hearing loss, acoustic trauma, and vertigo as the most
7 relevant conditions to consider in the assessment of tinnitus. This consensus represents a second
8 facilitator in discussions on and implementation of European guidelines,
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13 The treatment options reported by respondents also showed clear trends according to region. This
14 finding can be classified as a *fifth barrier*, in that it might be difficult to get consensus on what
15 works for whom when many treatment avenues are preferentially made available. When
16 developing a guideline it is of importance to provide clear indications on which treatments are
17 recommended, which are not recommended, and which have insufficient evidence to make a
18 recommendation in either direction [30].
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25 There was consensus on the diagnostic tools to be used to assess tinnitus patients in clinical
26 practice. Although some small differences in procedures were reported, most experts use otoscopy
27 and pure tone audiometry. There is some variability in the use of other diagnostic tools suggesting
28 a potential third facilitator to discussions, on the inclusion of standardised diagnostic procedure in
29 the guidelines.
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36 A sixth barrier to standardised practice emerging from our data may be the limited use of clinical
37 questionnaires in eastern and southern countries. Yet consensus exists that in research as well as
38 the clinic questionnaires are key in assessment, both for screening and monitoring treatment
39 progress [2, 31]. The most commonly used questionnaire however, irrespective of region, was the
40 Tinnitus Handicap Inventory (THI). This finding is consistent with a previous study [32]. This
41 might offer a fourth facilitator to discussions, on primary outcome measures to recommend within
42 a guideline.
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50 When asked how patients pay for treatment, respondents from southern and eastern Europe
51 reported fewer patients pay privately for their tinnitus healthcare. Nonetheless, in all regions,
52 tinnitus treatments were financed by national health insurance schemes. This may become
53 restrictive if health insurance companies have a strong influence on what tinnitus treatment options
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3 are made available within a country. When patients pay for treatment privately, more treatment
4 options might be on offer, even without adequate evidence of effectiveness. That there are
5 differences in how patients pay for treatment is a seventh barrier to standard care across Europe,
6 and a difficult one. In cases where the regulatory bodies in health care in a country are unwilling
7 or unable to hold to the restrictions or recommendations stated in a guideline, the chances of
8 implementation of this guideline drastically decrease.
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15 Less than half of respondents from the south and east of Europe reported they were satisfied with
16 current tinnitus healthcare in their country. This dissatisfaction may represent a fifth facilitator in
17 that professionals are likely to be positive about progressive guidelines and towards changes in
18 healthcare for tinnitus.
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24 Finally, economic prosperity in a country often defines healthcare organization and healthcare
25 satisfaction [33]. In the current study, it was hypothesized that the economic resources available to
26 individuals in a country might dictate the view of professionals on levels of advancement in
27 healthcare for tinnitus. This was indeed the case. Lower average net income in the country of origin
28 of respondents was associated with reports of fewer specialized tinnitus healthcare; fewer
29 specialised tinnitus-clinics, less time for tinnitus-patients per consult, and more often a lack (or
30 use) of guidelines. Lower average income was also associated with lower satisfaction of the
31 respondent with healthcare, and more necessity of referral by a GP. Interestingly, higher average
32 net income in a country was associated with seeing more patients per month.
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41 Some additional points are worthy of discussion. First, from the 24 countries who participated in
42 the survey, some had many more respondents than others. This issue was presently solved by
43 stratifying the countries according to region of Europe to yield similar respondent numbers per
44 region. Nevertheless, responses from Lithuania and the Czech Republic might have a strong
45 influence on the eastern region data, because of the large number of respondents from these
46 countries. Second, most respondents were otologists. The large (over)representation of this
47 discipline might indicate that other disciplines are less involved in tinnitus health care, and that
48 current reports rely heavily on the clinical views and experiences of otologists and might not reflect
49 views or opinions of professionals of other disciplines. Third, it is important to note that the current
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findings do not necessarily indicate or reflect a right or wrong in the organisation of tinnitus healthcare, the available assessment and treatment options for tinnitus in a country, or the advancement of specialised healthcare in a country. It is important that the current results are seen in the light of establishing potential facilitators and barriers (see Box 1 below for summary) to the development and implementation of a guideline that can serve the whole of Europe, by being meaningful and actionable, and offer advice and options for professionals in the field, and the patients they care for.

BOX 1: Summary of Barriers and Facilitators

Barriers

- 1 Lack of knowledge about or non-existence of specialised tinnitus clinics or teams makes it difficult for tinnitus patients to find their way to the most appropriate professionals in a country.
- 2 Lack of time or other resources for adequate counselling
- 3 Lack of time or other resources for professionals responsible for tinnitus patients to be able to adequately assess the distress-level of tinnitus patients
- 4 Lack of multidisciplinary teams, and/or availability of psychologists in southern and eastern European countries
- 5 High variation in available treatment options; more medical-pharmacological treatment in southern and eastern countries. psychological-rehabilitative approaches more available in northern countries. When many treatment avenues are considered viable it may be difficult to reach consensus on what works for whom
- 6 The use of self-report instruments is much less common in southern and eastern countries
- 7 There are differences in how patients pay for treatment. If regulatory bodies in healthcare in a country are unwilling or unable to hold to the restrictions or recommendations stated in a guideline, the likelihood of implementation of this guideline is lower.

Facilitators

- 1 Common ground in expert-opinion that tinnitus is a central auditory symptom. This offers options for discussions on the definition of tinnitus in a European guideline
- 2 Consensus across regions on what conditions are relevant or associated with tinnitus. Harmonies such as these are to be highlighted where possible to facilitate implementation of a standard guideline
- 3 Though some small differences in procedures were reported, most experts use otoscopy and pure tone audiometry. Findings will facilitate discussions on diagnostics to include in the guidelines
- 4 The most commonly used questionnaire irrespective of region is the Tinnitus Handicap Inventory. This may facilitate discussions on assessment methods to recommend within a guideline
- 5 The percentage of respondents satisfied with current tinnitus healthcare in their country in southern and eastern Europe was low; less than half of respondents reported they were satisfied. Healthcare professionals are likely to be positive towards progressive guidelines and towards changes in health care for tinnitus.

Contributorship statement

RC wrote the first draft of the manuscript and performed the statistical analyses. DK and TB developed and designed the online questionnaire and performed preliminary analyses. DH provided extensive feedback on the initial draft and cowrote further versions of the manuscript.

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3 All remaining authors (BM, HH, CC, AN, AL, TB) provided feedback and offered critical
4 analyses of the main text and results on all drafts of the manuscript.
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40 **Competing Interests**

41 All authors have declared that there are no competing interests.
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45 **Data are available upon reasonable request**

46 Deidentified participant data will be made available through corresponding author
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50 **Figure captions & Legends**

- 53 • FIGURE 1. Responses from each participating country
 - 54 • FIGURE 2. Discipline of respondents
 - 55 • FIGURE 3: Most common referrals according to region
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- FIGURE 4. Main questionnaire used per region

For peer review only

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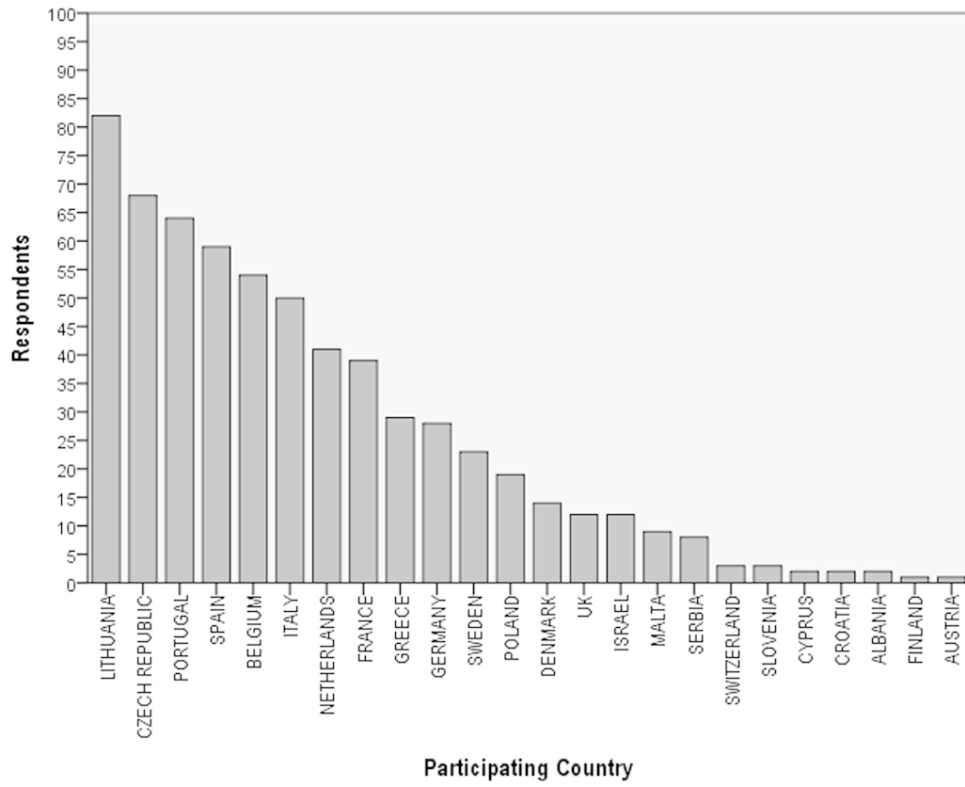


Figure 1. Responses from each participating country

90x72mm (300 x 300 DPI)

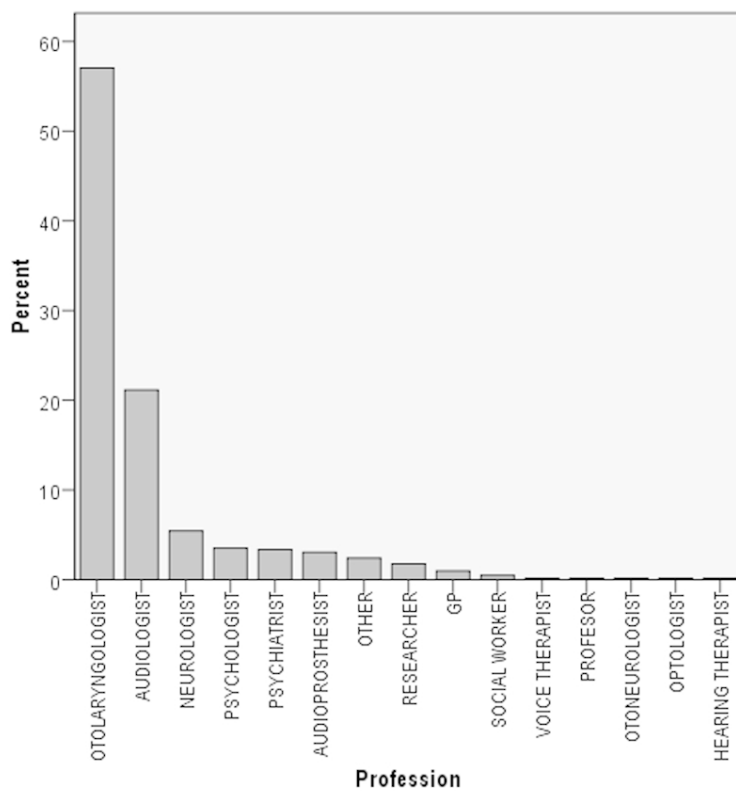
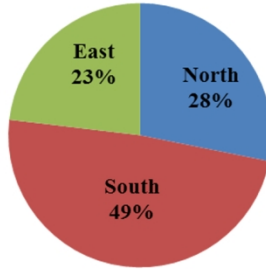


Figure 2. Discipline of respondents

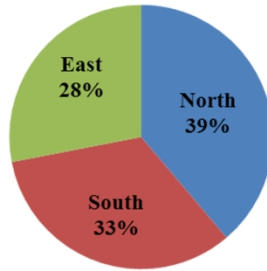
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Self-referral most common



Referral by ENT most common



Referral by Audiology most common

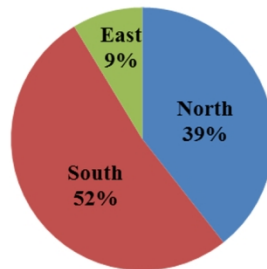


Figure 3. Most common referrals according to region

90x172mm (300 x 300 DPI)

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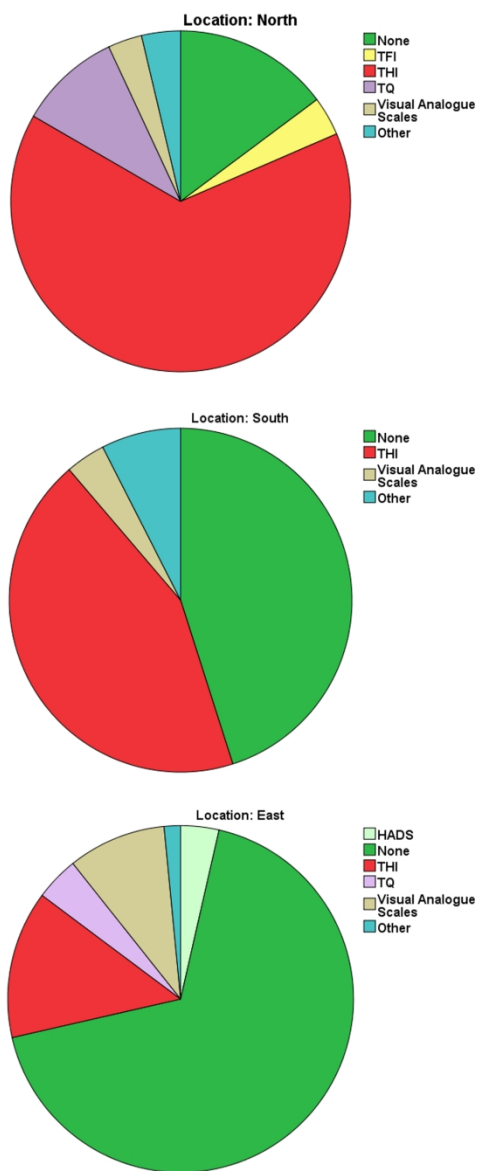


Figure 4. Main questionnaire used per region

90x216mm (300 x 300 DPI)

Supplemental information 1: The survey

DEMOGRAPHICS
<p>1. Age</p> <p>2. Gender</p> <p>3. In which country do you reside?</p> <p>4. What is your profession? (Multiple choice). Options: GP, ENT, psychologist, psychiatrist, neurologist, audiologist, other, namely...</p> <p>5. Where do you work? (Multiple choice). Options: Public hospital, private hospital, university, university hospital, private office/practice, other, namely...</p>
NATIONAL HEALTH-CARE STRUCTURE
<p>6. Are there specialized tinnitus healthcare-units in your country? (yes/no)</p> <p>7. What referral pathways for tinnitus patients are typically used in your country? (Multiple choice). Options: GP, ENT, Internet, directly, hospital, psychologist, dentist, community services, other, namely...</p> <p>8. Is a consultation with GP necessary to go to a tinnitus unit/clinic/ENT/Audiological centre? (yes/no)</p>
STATUS OF THE PATIENT
<p>9. Do you consider tinnitus to be...? (Multiple choice). Options: Symptom, disease, audiological problem, psychological problem, none of the above, other, namely...</p> <p>10. What is on average the emotional status of your patient at the moment of first consultation? (5-point Likert). Options: Very positive, somewhat positive, neutral, distressed, very distressed</p> <p>11. Do you see predominantly...? (Multiple choice). Options: Chronic tinnitus (more than 3 months), acute tinnitus (less than 3 months), both</p> <p>12. How much time can you allocate to an individual tinnitus patient in one consultation? (Multiple choice). Options: 1-10 min, 10-30 min, 30-60 min, More than 60 min</p> <p>13. How many tinnitus patients do you see in one week? (Multiple choice). Options: Less than 1, 1-5, 6-10, More than 10</p>
MANAGEMENT OF THE PATIENT
<p>14. Is there a protocol for tinnitus management in your country? (yes/no)</p> <p>b. If yes, how often do you use it? (5-point Likert). Options: Always, almost always, sometimes, almost never, never</p> <p>15. What disciplines most often handle tinnitus patients in your country? (Multiple choice). Options: ENT, audiology, psychology, psychiatry, physiotherapy, neurology, dentistry, other, namely...</p>

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6 16. Is there a multidisciplinary approach to treat the tinnitus patient? (yes/no)
7 b. If yes which professionals are included? (Multiple choice). Options: ENT, audiologist, psychologist,
8 psychiatrist, physiotherapist, neurologist, dentist, other, namely...
9
10 17. Which medical/psychiatric conditions are taken into consideration when examining tinnitus patients?
11 (Multiple choice). Options: Hypertension, diabetes, thyroid dysfunction, TMJ disorders,
12 psychological/psychiatric disorders, hearing loss, hyperlipidaemia, dizziness, cervical disorders, migraine,
13 allergy, other
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16 TREATMENT AND DIAGNOSTICS

- 17
18 18. What kind of clinical department in your country treats tinnitus patients? (Multiple choice). Options:
19 ENT, audiology, psychology, psychiatry, physiotherapy, neurology, dentistry, other, namely...
20
21 19. What are the treatments options for tinnitus patients in your center? (Multiple choice). Options: TRT,
22 CBT, mindfulness, relaxation, coping training, counselling, medication, advise/counselling, alternative
23 therapies, sound therapy, rTMS, neurofeedback, physiotherapy, dental procedure, other
24
25 20. What diagnostic tools do you use on a tinnitus patient? (Multiple choice). Options: Questionnaires,
26 micro-otoscopy, tympanometry, nasal endoscopy, pure tone audiometry, high frequency audiometry (12,
27 16, 20 kHz), speech audiometry (hearing loss), tinnitus pitch and loudness – LDL – LMM – IR, broad
28 band noise EP, pure tone EP, (DP)OAE, air-conduction auditory steady-state responses (AC-ASSR),
29 EEG, CT, MRI, angio-MRI.
30
31 21. Which questionnaires do you use to assess tinnitus severity? (Multiple choice). Options: TQ, TRQ, TFI,
32 THI, TFI, TSCH, HADS, BDI, STAI, VAS scales, Grade from 1 to 10, other, namely
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34 22. How do your patients pay for treatment? (Multiple choice). Options: Public health, health insurance,
35 privately, other, namely...
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37 23. Are you satisfied with the current service provided by your healthcare-unit? (yes/no)
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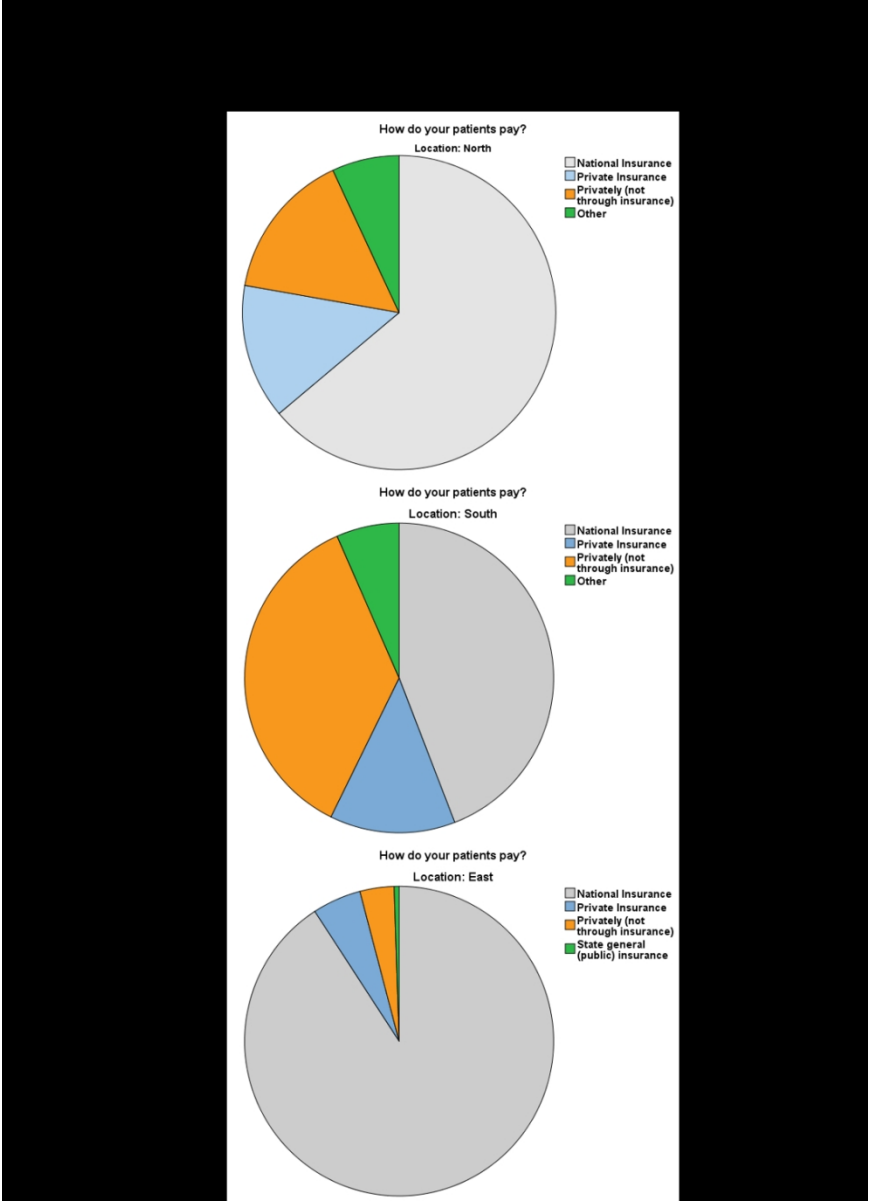
Supplemental Information 2: Average net monthly income per country and per region

n	Region	n	Percent	Income*	
1	ALBANIA	3	2	0,3	370
2	AUSTRIA	1	1	0,2	2009
3	BELGIUM	1	54	8,6	2091
4	CROATIA	3	2	0,3	754
5	CYPRUS	2	2	0,3	1658
	CZECH				
6	REPUBLIC	3	68	10,9	772
7	DENMARK	1	14	2,2	3095
8	FINLAND	1	1	0,2	2509
9	FRANCE	1	39	6,2	2157
10	GERMANY	1	28	4,5	2265
11	GREECE	2	29	4,6	947
12	ISRAEL	2	12	1,9	1924
13	ITALY	2	50	8	1725
14	LITHUANIA	3	82	13,1	616
15	MALTA	2	9	1,4	1021
16	NETHERLANDS	1	41	6,6	2263
17	POLAND	3	19	3	677
18	PORTUGAL	2	64	10,2	984
19	SERBIA	3	8	1,3	377
20	SLOVENIA	3	3	0,5	692
21	SPAIN	2	59	9,4	1718
22	SWEDEN	1	23	3,7	2465
23	SWITZERLAND	1	3	0,5	4760
24	UK	1	12	1,9	2120
24	Total		625	100	

*Average net monthly income

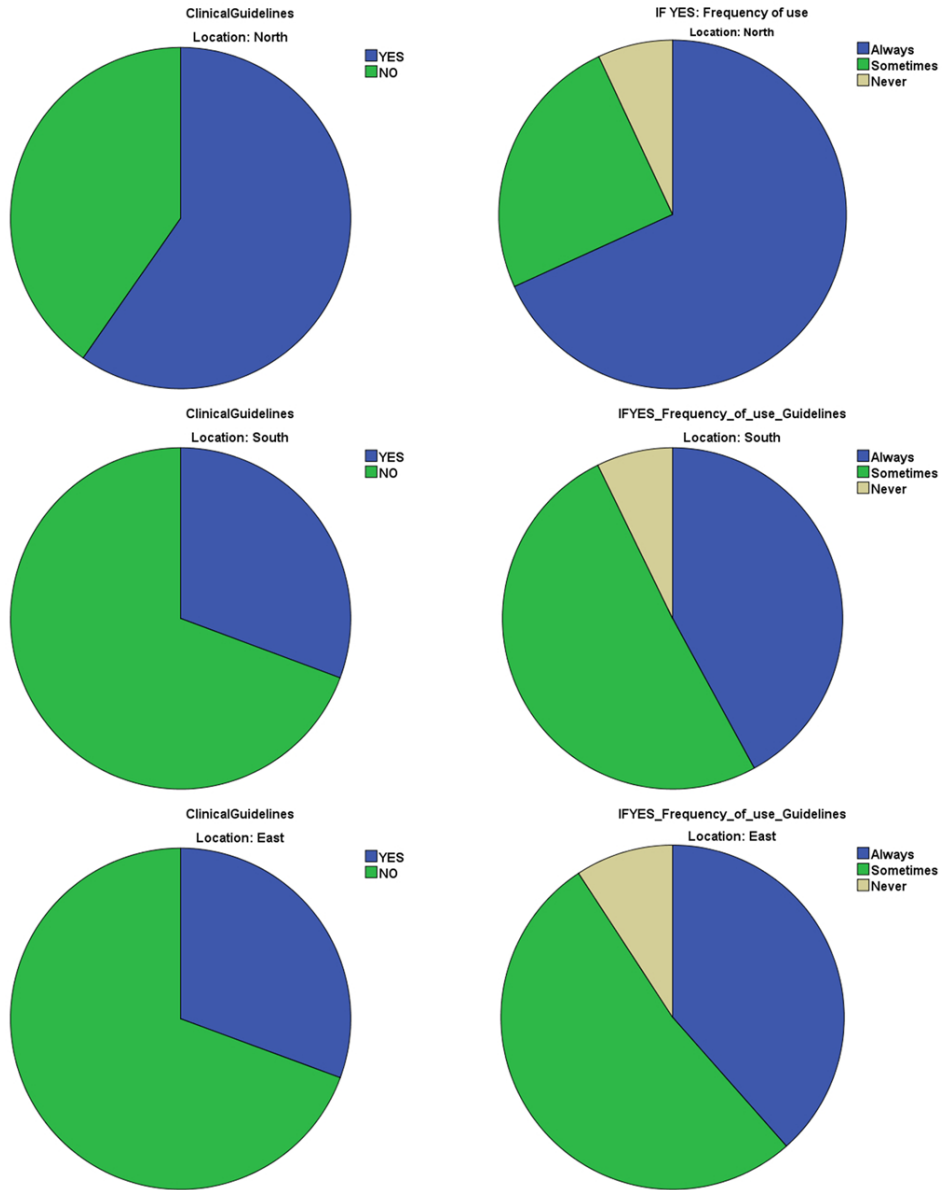
Region	total	mean	n
1	25734	2573,40	10
2	9977	1425,29	7
3	4258	608,29	7

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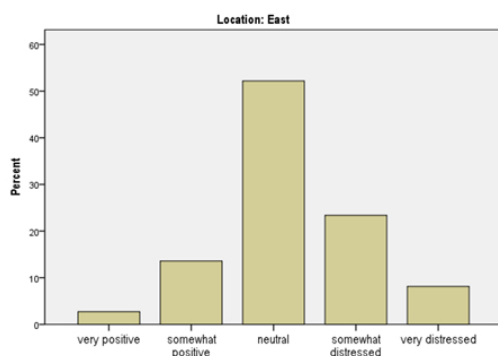
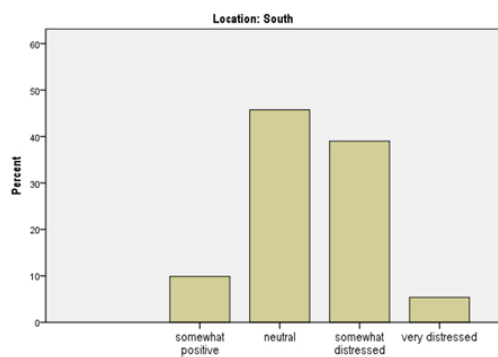
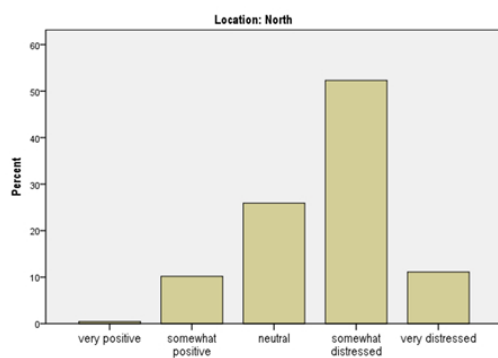
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Supplemental information 4: Existence and frequency of use of clinical guidelines (according to region)

90x108mm (300 x 300 DPI)



Supplemental information 5. Emotional status of patients according to the specialist from north, south and eastern parts of Europe

38x90mm (300 x 300 DPI)