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Telemedical Second Opinions in Germany – a Customer Survey of an Online Portal

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Abstract

Background

Second medical opinions (SOs) can strengthen patients' certainty in decision-making. Since 2019, statutory health insured German residents have the right to obtain an SO for selected indications according to the SO Directive. Additionally, several health insurers offer SO programs often in cooperation with telemedical SO providers. Telemedical SO programs are mostly based on documents only. Our aim was to analyze the characteristics of people who obtained telemedical SOs, their experiences made during the SO process, and their assessment of SOs in general and of the different routes of SO delivery (personally/by phone/documents only).

Methods

German residents who obtained an SO via an online portal between January 2016 and February 2019 (n=1247) were contacted by post between August and November 2019 up to three times. The results were analyzed descriptively.

Results

The 368 participants (response rate 30%) were 54% male, 95% statutory health insured and 61 years old (median; interquartile range 51-72). Most participants reported having an orthopedic condition (87%) or had been recommended surgery (78%). The most common reason for seeking an SO in general was the need for more information on further treatment recommendations (64%). A telemedical SO was mainly chosen because it was offered by the health insurer (82%). Disagreements between first opinions and SOs occurred in 55% of the participants. Approximately 60% of the participants with disagreements followed the treatment recommendation of the SO. For 67% of the participants, the SO (rather) enhanced the certainty in decision-making. Approximately 75% were (rather) satisfied with obtaining the SO via the online portal, and 95% would seek another SO (irrespective of the online portal). The most preferred route of SO delivery was a personally delivered SO, which 80% would (rather) consider, followed by 70% (rather) considering SOs based on documents only and 48% (rather) considering SOs by phone.

Conclusion

SOs were generally appreciated. Although our results show that SOs (based on documents only) support patients and that patient satisfaction was high, personally delivered SOs were still preferred. Future research on the use of SOs based on documents only (in which patient population and in what situations) is needed.

Introduction

Second medical opinions (SOs) can help patients better understand their diagnoses and gain more confidence when deciding between different treatment options [1, 2]. Furthermore, SOs are used to validate diagnosis and treatment recommendations [3, 4] and decrease the number of surgeries [4–8]. The first SO

program was introduced in the USA in the 1970s [5]. Since then, SOs have been assessed in different parts of the world [4, 9–13].

In Germany, the SO Directive introduced the right for statutory health insured persons to obtain an independent SO that is free of charge when having an indication for hysterectomy, tonsillectomy, tonsillotomy, shoulder arthroscopy, or implantation of a knee prosthesis. Amputation due to diabetic foot syndrome was added to the list but did not come into force yet, and further indications will probably be added [14]. Currently, the SO Directive is restricted to personally delivered SOs within direct patient-physician contact. According to the last update (not yet in force), the SO has to be provided verbally, which means that telemedicine is not generally forbidden. Telemedicine aims to overcome geographical barriers in the provision of healthcare services by using modern information and communication technologies [15]. Telemedicine was mentioned by older residents as a possible solution for areas with insufficient access to medical specialists [16]. Accordingly, telemedical SOs might have the potential to level out regional discrepancies in accessing medical specialists for providing an SO [17].

Separately, German health insurers are allowed to offer SO programs for indications that are not included in the SO Directive. Many statutory health insurers provide such SO programs [18], and many of the SO programs are telemedically provided (more precisely, based on documents only), which regularly do not include personal patient-physician contact [19]. Moreover, patients can directly access medical specialists without previously contacting a general practitioner.

The Medexo company is an online portal cooperating with health insurers and offering SOs based on documents only. During the SO process, the patient characteristics were collected by a general questionnaire. Furthermore, the patients submitted (digital or by post) all relevant medical records (such as imaging and pathological findings). Medexo has in-house specialists for medical operations and case management who are responsible for reviewing the submitted material. If all necessary documents are included, the documents are submitted to an external physician expert on the respective indication. The physician expert compiles an SO based on the submitted documents (without any contact with the patient). The in-house specialists at the online portal create an SO that is comprehensible for patients based on the SO of the physician expert. Then, the comprehensible SO is sent to the patient. If there are any questions concerning the SO, the patient can consult the online portal or the physician (via the online portal). A recent analysis of secondary data revealed high patient satisfaction and large discrepancies between first opinions (FOs) and SOs [17]. However, several questions could not be answered by the secondary data analysis, which we aimed to address in our current survey.

Our aim was to analyze the characteristics of people who obtained a telemedical SO, their experiences during the SO process, their assessment of SOs in general and their assessment of the different routes of SO delivery (personally delivered/delivered by phone/based on documents only) by directly surveying customers of the online portal.

Methods

This work is part of an ongoing project on SOs in Germany called ‘ZWEIT’. ‘ZWEIT’ is funded by the ‘Innovation Fund’ of the federal joint committee and conducted in cooperation with the Brandenburg Medical School, Medexo, AOK Nordost (a statutory health insurer), and the Association of Statutory Health Insurance Physicians of Brandenburg. ZWEIT was approved by the ethics committee of the Brandenburg Medical School (case number: E-01-20190529). Further information on ZWEIT can be found in our protocol [20].

We followed guidelines on conducting and reporting survey research [21]. We developed our questionnaire within interdisciplinary meetings between researchers and experts by the online portal. The questionnaire was developed to survey customers of the online portal on their experiences made during the SO process. The questionnaire was divided into five parts: the background for seeking an SO in general (six items), the background related to the telemedical SO provided by the online portal (three items), experiences during the telemedical SO process (21 items), health-related (two items) and sociodemographic questions (eleven items). We used the German version of the Decisional Conflict Scale (DCS) [22]. When participating in our survey, the participants’ decision process was already some time ago. Therefore, we decided to change the present tense of the DCS to past tense and skipped the item ‘I expect to stick with my decision’ because we assumed it to be outdated for the participants. We decided to exclude participants with missing values from the analysis of DCS (since the user manual does not contain information on how to deal with this case). We used a short form of the European Health Literacy Survey containing 16 questions [23]. In addition to the 4 answer options (very easy, fairly easy, fairly difficult, very difficult) respondents had also the possibility to state ‘do not know’. The questionnaire included a mixture of open-ended and close-ended questions (including dichotomous questions or questions with a set of possible answers). We pilot tested the questionnaire with customers (n = 8) of the online portal who obtained an SO between January and June 2015 or between January 2019 and February 2019.

German residents who obtained a telemedical SO via a large online portal between January 2016 and February 2019 (n = 1247) were initially contacted by post by the online portal in August 2019. They received both an invitation to participate in our survey as well as in qualitative interviews that are part of another paper (not yet published). To be able to contact nonresponders again, the questionnaire included a case number. To guarantee pseudonymization, only the online portal knew the assignment of the case numbers to the individual customers. Responders sent the completed questionnaire (including the case number) to Witten/Herdecke University. Therefore, the consent of health insurers was implicitly provided, obviating the need to obtain separate informed consent. Witten/Herdecke University forwarded the incoming case numbers to the online portal to exclude responders from the reminders. Two postal reminders were sent in October and November 2019. We compared age, gender, health insurance status, settlement pattern (cities, towns and suburbs, and rural areas), and indications between participants and the basic population to assess selection bias. The online portal provided month and year of birth, gender, type of health insurance (statutory vs. private), postal codes, and type of indication of the basic population. One author categorized answers to open-ended questions and another author verified the categorization. To collect data on settlement patterns, the collected postal codes were categorized according to the “degree of urbanisation” (DEGURBA) by Eurostat [24] and the regional statistics of the Federal Statistical Office [25]. One person extracted the questionnaire data (AB) into an Excel spreadsheet developed a priori, and another person checked the accuracy of all

extracted data (NK). We discussed discrepancies until a consensus was achieved. We analyzed the results using Microsoft Excel.

Results

Basis characteristics

Overall, 368 customers of the online portal participated in our survey (response 30%). Only a few refusals were made, and the reasons were death or physical impairment (often indicated by relatives or caregivers). The participants were slightly more often male (200/368; 54%), the majority were statutory health insured (350/368; 95%), and the median age was 61 years. Most participants reported having an orthopedic condition (319/368; 87%) or had been recommended surgery by the FO provider (meaning the physician providing the FO for which an SO was obtained) (288/368; 78%). The majority of participants (152/368; 41%) lived in cities. Health literacy was (likely) inadequate in 18% (68/368), (likely) problematic in 32% (118/368), and (likely) sufficient in 30% (111/368). There were no considerable deviations between responders and the basic population (Table 1).

Table 1
Characteristics of participants and basic population.

	Participants (n = 368) Total (%)/Median; interquartile range	Basic population (n = 1247) Total (%)/Median; interquartile range
Gender		
Male	200 (54%)	667 (53%)
Female	165 (45%)	580 (47%)
Missing	3 (1%)	0 (0%)
Health insurance status		
Statutory health insured	350 (95%)	1174 (94%)
Privately health insured	8 (2%)	57 (5%)
No (valid) answer	10 (3%)	16 (1%)
Marital status		
Married/registered partnership, living together	264 (72%)	
Single	43 (12%)	
Divorced/registered partnership annulled	22 (6%)	
Widowed/death of registered partner	21 (6%)	
Married/registered partnership, living apart		
No (valid) answer		
	3 (1%)	
	15 (4%)	Data not available

Abbreviations: SO-second opinion and FO-first opinion

Note: Due to rounding differences, the above percentages might not sum up to 100%.

	Participants (n = 368) Total (%)/Median; interquartile range	Basic population (n = 1247) Total (%)/Median; interquartile range
Educational level		
Vocational qualification ongoing	2 (1%)	
Without vocational qualification	9 (2%)	
Vocational qualification (duration at least 1 year) completed	221 (60%)	
Higher education degree	109 (30%)	
No (valid) answer		
	27 (7%)	Data not available
Medical indication		
Orthopedics including	319 (87%)	1036 (83%)
Knee	130 (35%)	359 (29%)
Neurosurgery/spinal surgery	89 (24%)	352 (28%)
Hip	43 (12%)	139 (11%)
Shoulder	37 (10%)	123 (10%)
Foot	14 (4%)	46 (4%)
Hand	6 (2%)	17 (1%)
Oncology	19 (5%)	68 (5%)
Cardiology	14 (4%)	61 (5%)
General and visceral surgery	4 (1%)	6 (0%)
Gynecology	1 (0%)	6 (0%)
Other	10 (3%)	70 (6%)
Missing	1 (0%)	0 (0%)
Age (median; interquartile range)	61 years; 51–72 years	58 years; 49–70 years

Abbreviations: SO-second opinion and FO-first opinion

Note: Due to rounding differences, the above percentages might not sum up to 100%.

	Participants (n = 368) Total (%)/Median; interquartile range	Basic population (n = 1247) Total (%)/Median; interquartile range
Population density of residence		
Rural areas	63 (17%)	222 (18%)
Towns and suburbs	115 (31%)	428 (34%)
Cities	152 (41%)	538 (43%)
Missing	38 (10%)	59 (5%)
Treatment according to FO		
Surgical	288 (78%)	
Mixed	38 (10%)	
Conservative	32 (9%)	
No (valid) answer	10 (3%)	Data not available
Health literacy		
(Likely) inadequate (0–8)	68 (18%)	
(Likely) problematic (9–12)	118 (32%)	
(Likely) sufficient (13–16)	111 (30%)	
No (valid) answer	71 (19%)	Data not available

Abbreviations: SO-second opinion and FO-first opinion

Note: Due to rounding differences, the above percentages might not sum up to 100%.

	Participants (n = 368) Total (%)/Median; interquartile range	Basic population (n = 1247) Total (%)/Median; interquartile range
Year of obtaining an SO (SO by the online portal)		
2016	70 (19%)	
2017	114 (31%)	
2018	126 (34%)	
2019	24 (7%)	
No (valid) answer	34 (9%)	Data not available
Abbreviations: SO-second opinion and FO-first opinion Note: Due to rounding differences, the above percentages might not sum up to 100%.		

Decision for a (telemedical) SO

Approximately 35% (131/368) already obtained another SO before consultation of the online portal in contrast to 61% (226/368) who did not obtain another SO before and 3% (11/368) who did not provide a (valid) answer. The two most important reasons for generally seeking an SO were the need for more information on further treatment recommendations (234/368; 64%) and the confirmation that the initial treatment recommendation was correct (223/368; 61%). Further reasons for seeking an SO were the confirmation that the diagnosis was correct (157/368; 43%), the wish for another treatment recommendation (156/368; 42%), the need for more information on the initial treatment recommendation (148/368; 40%), the need for more information on the diagnosis (129/368; 35%), a lack of trust in the FO provider (70/368; 19%), dissatisfaction with the consultation with the FO provider (57/368; 15%), the wish for another diagnosis (37/368; 10%), and the recommendation by relatives/friends or the FO provider (24/368; 7%). Another reason was stated by 13% (48/368), and 2% (6/368) did not give a (valid) answer (multiple answers possible).

We additionally asked for reasons for seeking a telemedical SO with an online portal. Most participants sought a telemedical SO because it was offered by their health insurer (303/368; 82%). Other participants stated the internet (53/368; 14%), a recommendation by relatives/friends (44/368; 12%), a recommendation by the FO provider (7/368; 2%) and positive experiences with telemedical SOs (3/368; 1%) as the reason for choosing an online portal for a telemedical SO. Furthermore, 7% (26/368) stated that ‘other’ reasons played a role, and 1% (3/368) did not give a (valid) answer (multiple answers possible).

Disagreements between FOs and SOs

Participants reported disagreements between FOs and SOs in 55% (202/368) compared to 40% (147/368) reporting no disagreement. The remaining 5% (19/368) did not give a (valid) answer. The most common disagreement was another treatment recommendation (145/202; 72%), followed by additional treatment

recommendation(s) (64/202; 32%), deviation of the diagnosis (42/202; 21%), and fewer treatment recommendations (24/202; 12%) while 5% (11/202) did not give (valid) answer (multiple answers possible). In case of disagreements, 20% (41/202) assessed balancing the different opinions to be easy, 21% (42/202) to be rather easy, 17% (35/202) to be neutral, 20% (40/202) to be rather difficult, and 18% (37/202) to be difficult. The majority of participants reporting disagreements (121/202; 60%) followed the treatment recommendation of the SO, 20% (41/202) followed the FO, and 14% (29/202) decided to choose a completely different treatment. The remaining 5% (11/202) did not give a (valid) answer. If no disagreement was reported, 69% (101/147) followed the treatment recommendations of the FO and SO, 19% (28/147) chose a different treatment, and 12% (18/147) made no (valid) answer.

Assessment of (telemedical) SOs

Approximately 75% (275/368) were (rather) satisfied with obtaining the telemedical SO via the online portal, and 70% (260/368) of participants stated that the SO process was (rather) easy (see Fig. 1). Overall, 95% (351/368) would seek an SO again (independent of the online portal or the health problem issued in the SO). The remaining 4% (12/368) would not seek another SO, and 1% (4/368) did not give a (valid) answer.

Approximately 80% (288/368) would (rather) consider a personally delivered SO, 48% (176/368) an SO delivered by phone and 70% (257/368) an SO based on documents only. Further details on the assessment of SOs are shown in Fig. 2. When comparing ratings for personally delivered SOs and SOs based on documents, the SOs based on documents had equal ratings in 41% (150/368), worse ratings in 33% (123/368), and better ratings in 20% (73/368) while 6% (22/368) did not provide a (valid) answer.

The participants were asked to specify the advantages and disadvantages of telemedical SOs compared to personally delivered SOs. The most often mentioned advantage of telemedical SOs was organizational aspects (153/368; 42%). These aspects included that the SO could be sought at any time and any place, that there is no time pressure (when formulating the questions addressing the physician and understanding the answer), the efficiency (meaning no waiting time in a doctor’s office or waiting for a doctor’s appointment), that there are no costs for the patient (e.g., travel costs), and last but not least the assistance to find an (appropriate) SO provider. The next important advantage was independence (79/368; 21%). Independence included anonymity (as patients and physicians do not know each other personally), the related objectivity (e.g., there is no influence of sympathy or antipathy), and sometimes financial interests (since the online portal does not allow the SO provider to perform the subsequent treatment). Another advantage was the method of transmitting the SO (37/368; 10%). This means that the SO is delivered in a written form, so the patient can take the time needed to read and understand the SO. Approximately 7% (24/368) mentioned expertise as an advantage of telemedical SOs (often arguing that experts that would not be located nearby are available for telemedical SOs). Approximately 2% (6/368) stated other advantages, 12% (43/368) stated that they saw no advantages at all, and 27% (99/368) did not give a (valid) answer. The most important disadvantage mentioned was the standardized process without direct and personal contact between the patient and the physician (202/368; 55%), which means that no physical examination and no direct conversation without any delay between the patient and the physician is part of the SO process. Some participants worried about a possible misdiagnosis because of the aforementioned aspects. Approximately 5% (19/368) mentioned a lack of trust (either in the physician or in the SO itself) as a disadvantage, and 4%

(15/368) mentioned technical or organizational issues such as the acquisition and submission of (diagnostic) findings. Furthermore, the prohibition of the SO provider from performing the subsequent treatment and data security were mentioned as disadvantages (2/368; 1% each). Approximately 4% (13/368) stated other disadvantages, 14% (50/368) stated that they saw no disadvantages at all, and 25% (93/368) did not give a (valid) answer.

Impact of SOs on the decision-making process

The SOs were delivered after a median of 14 days. It (rather) enhanced the certainty in decision- making in 67% (246/368), (rather) increased the understanding of diagnosis in 55% (210/368) and for 46% (168/368) of the participants there was no impact of the SO on trust in the FO provider. Detailed information on the further impact of the SOs is provided in Fig. 3.

The majority of participants (276/368; 75%) had no further questions due to the SO in contrast to 24% (88/368) with further questions (1% (4/368) did not give a (valid) answer). Approximately one-third of participants (111/368; 30%) obtained another medical opinion after consultation of the online portal (68% (252/368) stated that they did not obtain another medical opinion, and 1% (5/368) did not give a (valid) answer). The participants' health status was improved in 48% (178/368), followed by rather improved (84/368; 23%), not changed (45/368; 12%), rather declined (26/368; 7%), and declined (19/368; 5%). The remaining 4% (16/368) did not give a (valid) answer. Approximately 71% (262/368) reported that their health status had (rather) improved since their treatment decision.

Discussion

Most participants had an indication for orthopedic surgery. By far, the most important reason for seeking a telemedical SO with an online portal was that it was offered by the health insurer, which usually means that the SO is free of charge for the patient. For approximately two out of three participants, the SO (rather) enhanced certainty in decision-making, three out of four participants were (rather) satisfied with obtaining the telemedical SO via the online portal, and 70% stated that the SO process was (rather) easy. SOs were generally appreciated as 95% would seek an SO again (irrespective of the online portal). Personally delivered SOs were stated to be the most preferable route of SO delivery, followed by SOs based on documents only and SOs delivered by phone.

It is not surprising that most participants had an indication for (orthopedic) surgery. The high number of participants who have been recommended surgery might be a result of the discussion on the number of surgeries. For example, high regional disparities were shown for surgical procedures in general [26, 27] and for orthopedic surgery [28]. Beyond the disparities for orthopedic surgeries, other explanations for the high share of SO in orthopedic conditions might be that orthopedic SOs are very common [17, 18, 29]. Furthermore, the information on disagreements between FOs and SOs for orthopedic conditions could have reached the patients who consequently became more skeptical about the treatment recommendations when having orthopedic complaints [5]. A very interesting result is the share of participants who had already obtained one or more medical opinions (36%) before and the share of participants who obtained another SO after consultation via the online portal (30%). This shows that some patients obtain not only a single SO but also

multiple opinions. Even though much is known about the reasons for seeking SOs [30], it would be interesting to know the reasons for seeking multiple SOs and their implications. Perhaps people (at least some people) seek multiple opinions until they obtain the SO they want. This might be at least partially explained with 42% of participants stating that they sought an SO because of the need for another treatment recommendation. Another indication of this might be that 60% of participants with disagreements between FO and SO followed the treatment recommendation of the SO (while 14% choose a completely different treatment). In accordance with other studies, personally delivered SOs were the most preferred way of receiving an SO [13]. Nevertheless, we found a better rating of SOs based on documents only or delivered by phone than Geraedts et al., who found that 90% of people preferred a personally delivered SO with a physician compared to 10% preferring an SO delivered via phone or internet [13]. In contrast to our results, they included the general population (who probably do not have experiences with telemedical SOs). The differences in ratings of SOs based on documents only or delivered by phone might be explained by the (mostly) positive experiences made during the telemedical SO process. In particular, the fact that 75% were (rather) satisfied with obtaining telemedical SOs via the online portal might explain why participants abandon their reservations towards other methods of SO provision (especially towards SOs based on documents only). Another explanation could be that customers of an online portal might tend to have a more positive attitude towards this type of SO provision (as they have already obtained such an SO). In this context, our results that 14% of customers of the online portal would (rather) not consider an SO based on documents only are surprising. One possible explanation might be the structure of our question as participants were asked to rate the different routes of SO delivery using one question. Some of the participants might have interpreted this as a direct comparison of the different routes of SO delivery. Thus, participants who clearly prefer personally delivered SOs (but do not generally refuse SOs based on documents only) might have stated that they would (rather) not consider an SO based on documents only. Pragmatic reasons may have made them obtain SOs based on documents only even though they would prefer a personally delivered SO (if available). This is supported by our result that 82% sought a telemedical SO because it was offered by their health insurer. Another possible explanation might be that some of the customers would not seek another SO based on documents only because of their experiences made during the telemedical SO process. Overall, the customers of the online portal had nuanced attitudes towards telemedical SOs as many participants acknowledged that there are several (dis-)advantages of telemedical SOs compared to personally delivered SOs. The most important advantage mentioned was organizational aspects (including but not restricted to flexibility of time and place). This might be particularly important for people with less time for a doctors' appointment or people in rural areas with long traveling distances to physicians. Because telemedicine was mentioned as a possible solution for areas with an insufficient degree of access to medical specialists in a survey of older residents [16], we assumed that telemedical SOs would be more interesting for people living in rural areas. Interestingly, the share of people living in rural areas does not considerably differ between participants in our study, the basic population (percentages of our sample refer to participants with a valid answer) and the German population at all (19% vs. 19% vs. 20%, respectively) [31]. The share of participants living in rural areas might be influenced by health insurers contracting with the online portal because many SOs were offered by the health insurer. While some health insurers operate across the whole country, others operate in specific regions (such as federal states). Because of this, the share of participants living in rural areas might not be primarily explained by patient preferences but by the type of health insurer providing the SO. Even if telemedical SOs might be attractive for people in rural areas, there might be several reasons for people living outside of rural

areas to seek a telemedical SO. Otherwise, the most important disadvantage mentioned was the standardized process without any personal contact. This was in some cases combined with a lack of trust (in the telemedical SO itself and also in the SO provider). Some people seem to have a higher need for personal patient-physician contact while others do not. Furthermore, there were participants rating the lack of personal contact as an advantage as it provides a higher degree of objectivity in their opinion. This indicates that there are some patients for whom telemedical SOs are more suitable than others. As physicians more likely inform higher educated people about the possibility of seeking an SO [32] and higher education was mostly related to obtaining an SO [33], we assumed that customers of an online portal tended to have higher health literacy. Interestingly, our results showed a lower health literacy compared to the general population (percentages of our sample refer to participants with available total score: (likely) inadequate HLS 23% vs. 12%, (likely) problematic 40% vs 32%, and (likely) sufficient 37% vs. 56%, respectively) [34]. Cecon et al. found that less educated patients have different reasons for seeking SOs than higher educated patients including an association between less education and reasons related to the patient-physician relationship [35]. In our sample, reasons related to the patient-physician relationship only played a minor role in generally seeking SOs. We found that the most important reason for seeking telemedical SOs was that it was offered by the health insurer. Besides the fact that SO programs offered by health insurers are usually free of charge, another reason might be that people with lower health literacy use more likely SO programs by their health insurer (which often offers telemedical SOs) than people with higher health literacy who might have fewer difficulties seeking informal SOs. Because of this, telemedical SOs might be more interesting for patient groups with lower health literacy. The low health literacy is surprising because the participants had high education and income, and health literacy and social status were found to be positively correlated [36]. Due to missing values for health literacy, we could not calculate a total score for 19% of participants. This is considerably higher than in the study assessing the health literacy of the general population [34]. It remains unclear whether this was due to the questionnaire length or to the provision of the "do not know" category. Furthermore, there might be situations in which even patients who generally prefer personally delivered SOs would choose telemedical SOs or vice versa. For example, Peier-Ruser et al. showed that time pressure is one main barrier for seeking SOs [37]. It might be that patients who generally prefer personally delivered SOs but have a lack of time would choose a telemedical SO then. Overall, telemedical SOs are no ‘one-fits-all’ solution but might be suited for several patients and situations.

Therefore, it might be reasonable to discuss the current restriction of the SO Directive on personally delivered SOs. SO programs by statutory health insurers for indications included in the SO Directive have to comply with the regulations of the Directive. Even though the current update will include telemedical SOs that are verbally provided, statutory health insurers will not be allowed to provide telemedical SO programs based on documents only for those indications. As the number of indications included is increasing, the offer of telemedical SOs based on documents only will probably decrease. This is highly relevant because many statutory health insurers offer telemedical SO programs based on documents only [18]. Even though the standardization of SOs in Germany might help address the quite heterogeneous (and potentially confusing for patients) offerings of SO programs [18], the exclusion of telemedical SO programs based on documents only might prevent the possibility of improving medical care for several patients and situations such as patients with restricted mobility or living in rural areas. High discrepancies were found regarding the number of SO providers according to the directive with several agglomeration areas and large areas without any SO

provider [38]. One possible explanation might be that there is still some time needed to implement the SO Directive. Otherwise, there were systematic differences in the average travel time of patients to physicians found between urban and rural areas [39]. In the case of gynecologists, very long travel times were found for a considerable share of patients in more than half of the German counties [39]. This is particularly relevant because hysterectomy was one of the first indications of the SO Directive. Furthermore, for some patient groups, there were differences in the waiting times for appointments with physicians found [40]. For example, statutory health insured persons more often reported very long waiting times [40]. Because of the aforementioned travel and waiting times, it might be questionable whether it is possible to provide a sufficient supply of physicians providing personally delivered SOs in these areas. It is possible that the inclusion of verbally provided telemedical SOs may offset this, but this remains unclear. Particularly with regard to patient satisfaction (of those who obtained a telemedical SO based on documents only) being very high and the fact that 70% found that the telemedical SO process was (rather) easy, the exclusion of SOs based on documents only in the SO Directive might exclude some patient groups.

Comparison with other research

There are three current studies within a population of an SO program providing telemedical SOs based on documents only that are comparable to our study [17, 41, 42]. Berger et al. is restricted to people who obtained oncological SOs (N = 95) [42] in contrast to the remaining two including SOs on multiple specialties [17, 41]. Meyer et al. examined the participants (N = 6791) of a national SO program [41], and Weyerstrass et al. performed secondary data analysis on a population (N = 1414) of the same online portal providing SOs as we did (Medexo) [17]. Even though our patient satisfaction was high, with 75% being (rather) satisfied, the two studies assessing patient satisfaction found higher patient satisfaction (89% and 95%, respectively) [17, 41].

When comparing our results to the results of Weyerstrass et al., we found a considerably higher time for delivery of the SO (median 14 days vs. mean 5 days), which might explain (at least partially) the higher patient satisfaction found by them [17]. As a side note, a similar time for delivery of the SOs was found for oncological SOs compared to our results [42]. In contrast, our survey found that 30% obtained another opinion after the SO, which is lower than the 40% who obtained a third opinion in the secondary data analysis. In addition, we found that 55% of participants stated that there were disagreements between FOs and SOs compared to the previous findings that 65% had disagreements. We found a higher improvement in health status than Weyerstrass et al. (71% vs. 61%) [17]. Furthermore different methodological approaches could also explain the difference in patient satisfaction. Our current survey is more differentiated and obtaining the SO is (depending on the customer) longer ago (compared to 6 month after obtaining the SO by them).

There are four possible explanations for the higher patient satisfaction by Meyer et al. The most important point is that the SO (based on documents only by medical experts) was discussed with the patient (by employees of the SO provider) by default. Although Medexo is also available to its customers for queries, no regular discussion of the SO is scheduled. Meyer et al. found that 87% of participants were more confident in their diagnosis or treatment after receiving the SO. In our survey, we asked if the understanding of the diagnosis and the certainty in decision-making had (rather) increased, which was achieved by 57% and 67%, respectively. Even though the questions are not identical, it can be assumed that their participants gained higher confidence due to the SO [41]. As a side remark, our result for certainty in decision-making is in line

with the result of the previous analysis of customers of the online portal for assistance in treatment decisions [17]. Third, they found a considerably higher share of participants discussing the findings of the SO with the FO provider (34% vs. 84%). The high difference can be explained by the fact that they advised their participants to discuss the SO with the FO provider while the online portal in our study did not comment on this. It remains unclear whether this has any impact on patient satisfaction. Fourth, they found that for 90% of participants, the questions were answered. It can be discussed if this is comparable with our result on further questions due to the SO (and 24% of participants stating 'yes') as both have a different focus. However, their results suggest that 90% of participants had no questions after receiving the SO [41], which might partially explain the higher patient satisfaction.

Weyerstrass et al., Meyer et al. and this work found comparable shares of participants following the treatment recommendation by the SO (60% vs. 61% vs. 60% in case of disagreements between FOs and SOs and 69% in case of no disagreements, respectively) [17, 41]. This (partially) deviates from the third study's finding that 49% followed the SO's treatment recommendation in case of disagreements and 86% in case of no disagreements [42].

Strengths and limitations

Our results are restricted to patients who have already obtained a telemedical SO. Consequently, the participants might tend to have a positive attitude towards this method of SO provision. Because of this, our results are not generalizable to the general population. Furthermore, we cannot rule out selection bias. For example, it might be that customers of the online portal that were more satisfied tended to participate more often (or vice versa). To avoid this issue, we sent the nonresponders up to two reminders and compared the basic characteristics between participants and the basic population. Our study setting is an important limitation as our study is restricted to people who obtained telemedical SOs only and does not compare them with people who decide against a (telemedical) SO. Another limitation is the distinction between SOs based on documents only and telemedical SOs. In our questionnaire, we generally used the term 'telemedical' but the question on the different routes of SO delivery explicitly used 'SO based on documents only'. However, it remains unclear whether participants were truly aware of the differences.

Nevertheless, our results help to obtain a better understanding of telemedical SOs and the comparison between personally delivered and telemedical SOs. Particularly, the rating of the different ways of providing an SO (including potential advantages and disadvantages) from the perspective of people who have already obtained a telemedical SO is an important strength of our survey.

Implications for research and practice

Direct comparisons between the different ways of providing SOs are needed to assess their effects on the patients' decisions and their satisfaction. Furthermore, future research should analyze reasons for seeking multiple opinions. This might help to gain a better understanding of the differences, limits, and opportunities (telemedical) SOs provide. Additionally, better insight into the relationship between health literacy and telemedical SOs and the underlying reasons is needed. We will analyze differences between patient groups preferring personally delivered SOs and telemedical SOs in another part of the ZWEIT project (e.g., health

literacy or age). This would enable the advancement of SO programs addressing the needs of specific patient groups.

Conclusion

SOs were generally appreciated. Although our results show that SOs based on documents only support patients and that patient satisfaction was high, personally delivered SOs were still preferred. Future research on the use of SOs based on documents only (in which patient population and in what situations) is needed.

Declarations

Ethics approval and consent to participate

The ZWEIT study was approved by the ethics committee of the cooperating Brandenburg Medical School (case number: E-01-20190529). The participants agreed to participate in the study by voluntarily completing the questionnaire and thereby gave their informed consent.

Consent for publication

Not applicable

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

Within the ZWEIT project, we cooperate with the Medexo GmbH (second opinion provider). Within another project on second opinions, the Institute for Research in Operative Medicine of Witten/Herdecke University received funding from Medexo GmbH.

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Authors' contributions

NK: made substantial contributions to the design of the work, the data acquisition and analysis and the interpretation of the data and drafted the manuscript

BP: made substantial contributions to the design of the work and the data acquisition and analysis and substantively revised the manuscript

AS: made substantial contributions to the data acquisition and analysis and substantively revised the manuscript

AB: made substantial contributions to the data acquisition and analysis and substantively revised the manuscript

VW: made substantial contributions to the data acquisition and substantively revised the manuscript

JL: made substantial contributions to the data acquisition and substantively revised the manuscript

DB: made substantial contributions to the design of the work and substantively revised the manuscript

DP: made substantial contributions to the conception of the work and substantively revised the manuscript

All authors have approved the submitted manuscript. In addition, the authors have agreed both to be personally accountable for the author's own contributions and to ensure that questions related to the accuracy or integrity of any part of the work, even ones in which the author was not personally involved, are appropriately investigated, resolved, and the resolution documented in the literature.

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Not applicable.

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Figures

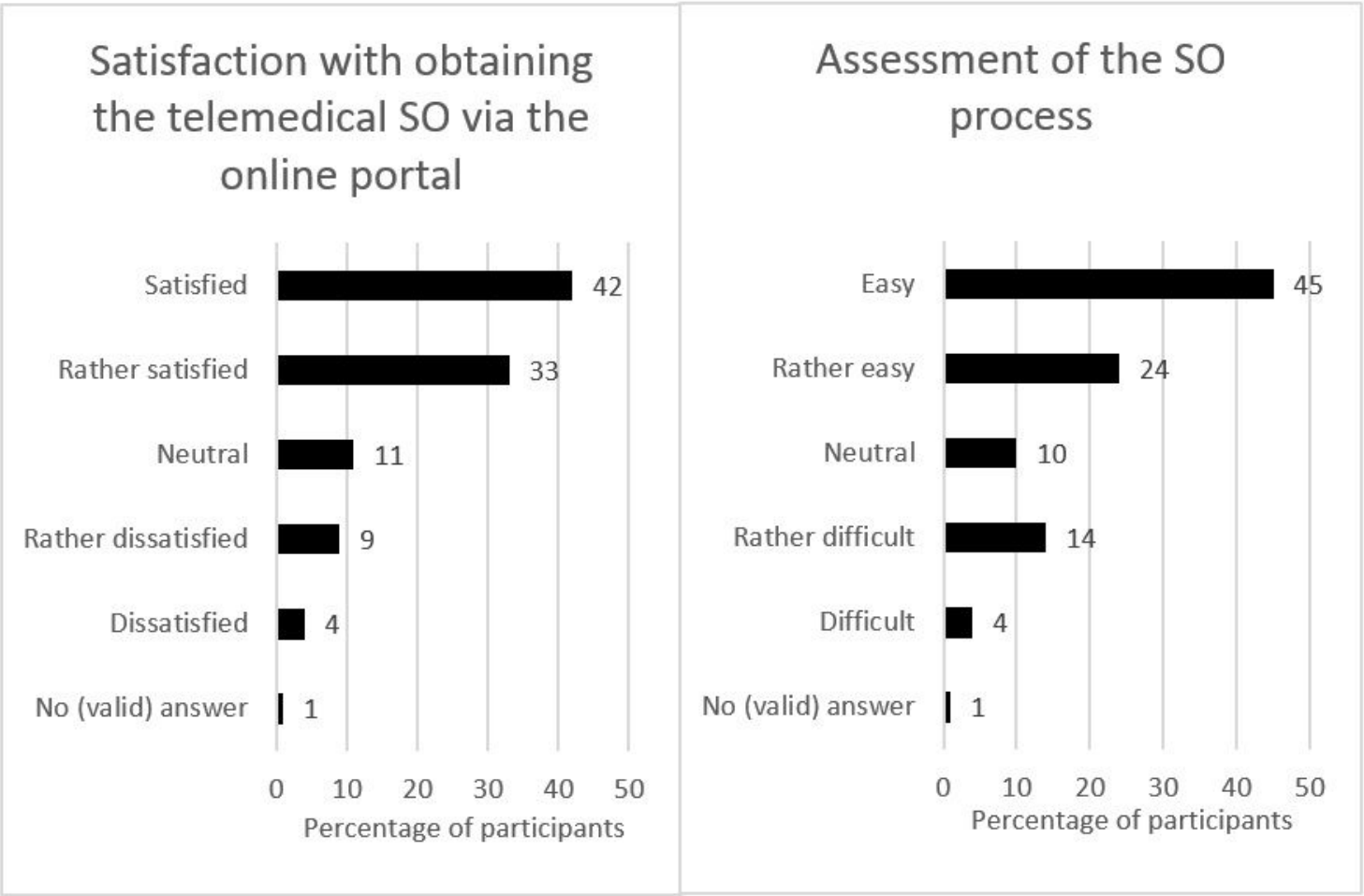

Figure 1

Assessment of telemedical SOs

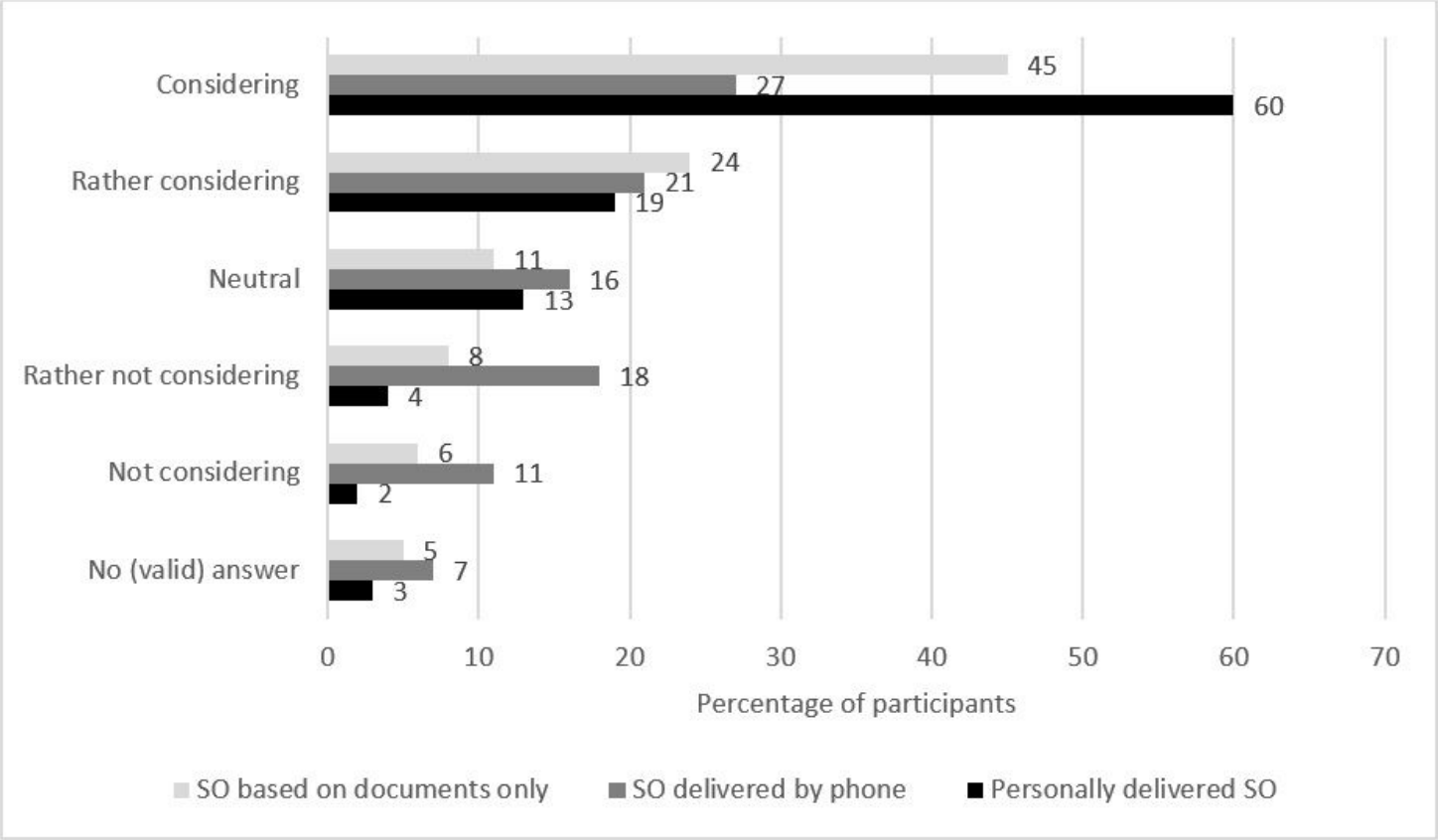

Figure 2

Consideration of different routes of SO delivery

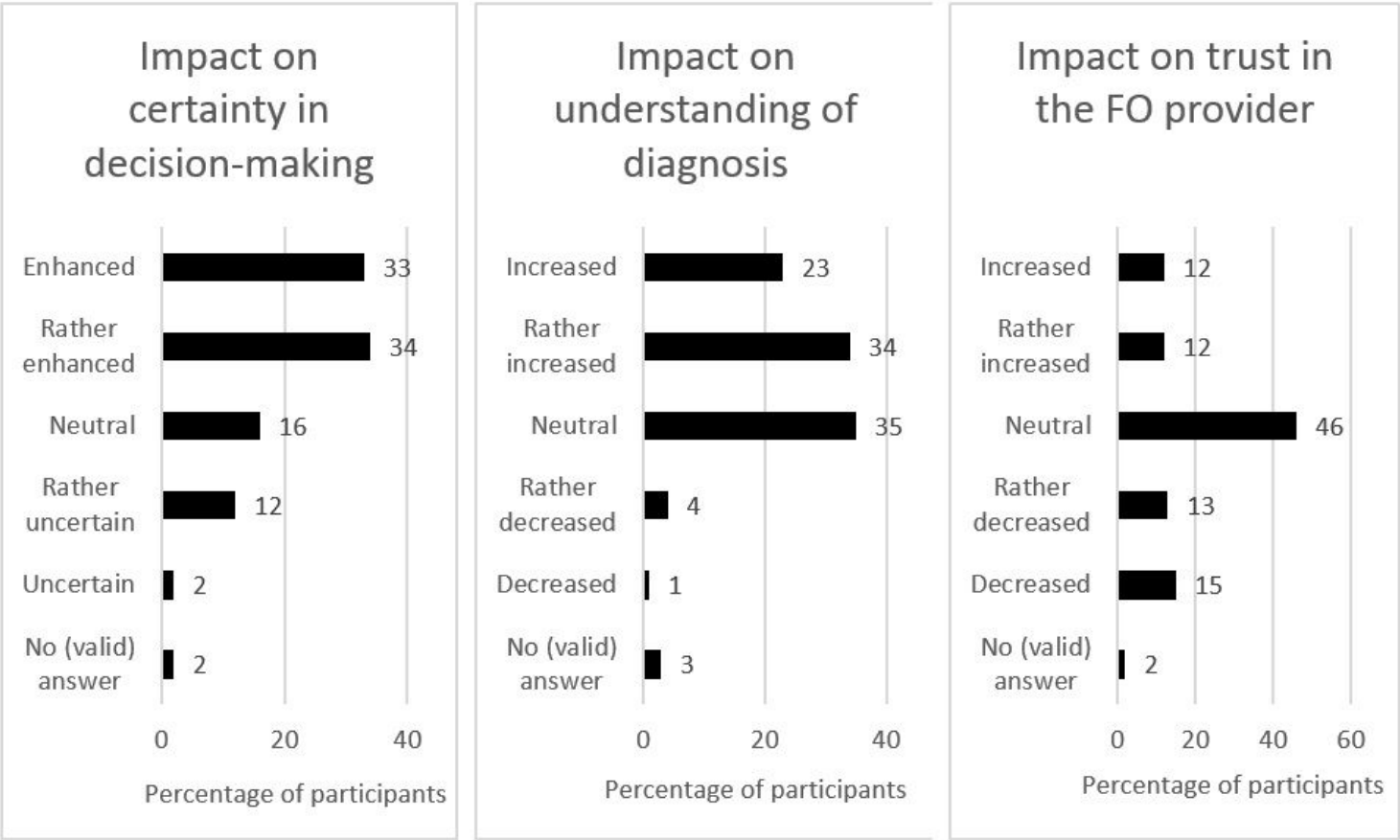

Figure 3

Impact of SOs on parts of the decision-making process

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