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Title: Ultrasonography in Rheumatology: Time to learn from patient views

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Abstract

Objective. The objective of this observational, descriptive, cross-sectional, multicentre study was to assess the perceived quality and grade of satisfaction expressed by patients with chronic arthropathies regarding the use of musculoskeletal (MSK) ultrasonography by rheumatologists as an integrated clinical care tool.

Methods. All Spanish rheumatology departments with MSK ultrasonography incorporated in their health-care services were invited to participate in the study. A Spanish-language survey was offered to fill out anonymously to all consecutive patients with chronic arthropathies under follow-up in the rheumatology outpatient clinics who attended their centre for a period of 3 months. The survey consisted of three sections. The first section contained patients' demographics, disease data, frequency of performing rheumatological ultrasound and information about who performed their ultrasound assessments. The second section consisted of 14 questions about patient's experience and opinion on different aspects of the management, performance, and perceived usefulness of performing ultrasound, to be answered on a Likert scale 1-5. The third section of the survey was addressed to the rheumatologist ultrasonographers.

Results. Nine hundred and four patients from 16 university hospital rheumatology departments completed the survey. All questions reached an overall favourable response $\geq 80\%$. Patients who reported usual ultrasound examinations in their rheumatology care and those in which it was their attending rheumatologist who performed the ultrasound assessments responded more favourably.

Conclusion. Our encouraging patient-centered results may be useful in facilitating the implementation of rheumatological ultrasound in rheumatology care worldwide.

Key-points

This is the largest multicentre survey carried-out in patients with chronic joint diseases designed to assess their experience and perceived benefits with the use of ultrasonography performed by rheumatologists in daily practice.

Musculoskeletal ultrasound incorporated into rheumatology care was very well accepted and valued by most patients.

The patients perceived that ultrasonography helps not only their rheumatologist but also themselves to better understand their condition.

The patients believed that ultrasonography helps them accept and comply with the proposed treatment.

Keywords. Ultrasonography, ultrasound, rheumatology, musculoskeletal, patients, arthropathies

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Competing interests

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Introduction

The use of musculoskeletal (MSK) ultrasonography has radically changed the diagnostic and therapeutic approaches of rheumatic diseases in daily practice. It is increasingly used to assist diagnosis, disease monitoring and prognosis of many inflammatory arthritis [1-4], as well as to guide aspirations, to deliver intralesional drugs or to guide biopsies [5]. MSK ultrasound education is becoming part of the rheumatology training curriculum across different European countries [6]. This rapid, non-invasive, non-ionizing radiation and inexpensive point-of-care tool allows the clinician to interact with the patient during the examination. A real-time ultrasound demonstration of inflammation or structural damage by the rheumatologists may improve patients' understanding and acceptance of their disorder [7,8] as well as increase the shared decision making and therapeutic adherence [9].

Modern medicine acknowledges that patients' experiences and preferences generated from qualitative studies are essential in patient-centered care in an evidence-based practice framework [10]. Today, MSK ultrasonography has been incorporated in routine rheumatology care in a considerable number of centres, particularly in Europe, yet patients' points of views have been scantily studied [11] and a comprehensive understanding of patients' views is warranted specially in countries where many rheumatologists perform MSK ultrasonography. The main objective of this observational, descriptive, cross-sectional, multicentre study was to assess the perceived quality and grade of satisfaction expressed by patients with chronic arthropathies regarding the use of MSK ultrasound by rheumatologists ultrasonographers as an integrated clinical care tool. The secondary objective was to identify areas for improvement in the management and performance of MSK ultrasonography in rheumatology.

Methods

All Spanish rheumatology departments with MSK ultrasonography incorporated in their health-care services, performed by at least one rheumatologist ultrasonographer member of the Ultrasound Study Group of the Spanish Society of Rheumatology (called ECOSER) were invited to participate in the study. There were 86 members of the ECOSER group at the start of the study, of which 27 rheumatologists from 16 Spanish centres expressed their willingness to participate in the study. The steering committee (EN, LM, JM-C and JU) designed a Spanish-language survey which was sent by e-mail to the 27 ECOSER members who had expressed their readiness to participate in the study.

The survey consisted of three sections. The first section contained the following data concerning patients' sex, age, educational level, rheumatological disease, time since diagnosis of their rheumatological disease, frequency of performing rheumatological ultrasound and a question on whether it was their usual rheumatologist or another rheumatologist from the same department who performed their ultrasound assessments.

The second section of the survey consisted of 14 questions about patients' experience and opinion on different aspects of the management, performance, and perceived usefulness of performing ultrasound, to be answered on a Likert scale 1-5 and with space for free-text comments.

The third section of the survey was addressed to the rheumatologist offering the survey to patients and consisted of the following data: age, sex, years as a rheumatology specialist, years of experience in

MSK ultrasound, centre where they worked as a rheumatologist and the implementation of clinical MSK ultrasonography in their rheumatology department.

Rheumatologists who agreed to participate in the study were asked to offer to fill out anonymously the first and second sections of the survey to all consecutive patients with chronic arthropathies under follow-up in their rheumatology outpatient clinics who attended their centre for a period of 3 months from the start of the study and who fulfilled the following inclusion criteria: 1) aged ≥ 18 years; and 2) have undergone ultrasonography as part of their rheumatological management during their clinical visits on at least one previous occasion. The survey was given to patients in paper format to be filled in with a pen. The time required to complete the survey was estimated to be about 10 minutes. Sections 1 and 2 of the survey, translated into English by one of the authors who is a native English speaker (JU), are given in Supplementary Table 1.

Likert scale scores were coded as 1 to 5, with 1 being the lowest agreement (No, not at all) and 5 being the highest agreement (Yes, definitely). For each question, overall favourable responses were considered when $\geq 70\%$ of respondents scored 4 or 5, except for question 7 where a score ≤ 2 was considered a favourable response. Unfavourable responses and therefore subject to improvement were considered when $<70\%$ of respondents scored 4 or 5, except for question 7 where a score > 2 was considered an unfavourable response.

The anonymous surveys completed on paper were archived in a folder in each centre until the end of the study. When the study period was over, all paper surveys were collected from all centres and all data, with centres and patients identified by a code, were entered centrally into a database for analysis by a person with expertise in data management who had not participated in the study.

The study was approved by the Ethics Committee of the Institute of Health Research Fundación Jiménez Díaz, as the Spanish reference centre, and by the Ethics Committees of all participating centres. The study was conducted in accordance with the Declaration of Helsinki (Fortaleza, Brazil, October 2013) and the Standards of Good Clinical Practice. All patients signed an informed consent form prior to inclusion in the study.

We used summary statistics to describe the results, namely the number of observations and absolute and relative frequencies. In addition, we estimated the 95% confidence intervals (95% CI) of the proportion of favourable responses for each item after collapsing the response categories. We used the chi-square test (or Fisher exact test depending on the number of subjects in the cells) to analyze the association between "favourable response" and 1) gender; 2) educational level; 3) frequency of MSK ultrasound assessments; 4) when the same rheumatologist who attends the patient performs the ultrasound; and 5) duration of rheumatic disease. We assumed a significance level of 0.001 to account for multiple hypotheses testing.

Results

Nine hundred and four patients from 16 university hospital rheumatology departments completed the survey.

Patient characteristics and ultrasound assessments (section 1)

Mean (SD; range) age of the participants was 56.6 (13.5; 18-95) years of which 73.5% were women and 26.5% men. Their level of education was mainly primary (46%) followed by secondary (29.1%) and university level (24.9%). The following chronic rheumatic diseases in order of frequency were reported: rheumatoid arthritis (RA), psoriatic arthritis, spondylarthritis, undifferentiated arthritis, microcrystalline arthritis, systemic autoimmune diseases (systemic lupus erythematosus, Sjögren's syndrome, undifferentiated connective tissue disease, systemic sclerosis), osteoarthritis, polymyalgia rheumatica, Behçet's syndrome, and vasculitis. The median (IQR) years since diagnosis was 5 (2-13) years.

Six hundred and eight (67.6%) patients responded that their ultrasound assessments were always performed by their attending rheumatologist while only 22 (2.4%) responded that sometimes they were. Two hundred and sixty-nine (29.9%) responded that their scans were performed by another rheumatologist from the same department. Patients (n=889) reported that frequency of the scans done or requested for during visits, was always in 153 (17.2%), often in 122 (13.7%), sometimes in 182 (20.5%), occasionally in 254 (28.6%) and hardly ever in 178 (20.0%) respondents.

Patient perceived experience and usefulness of MSK ultrasonography (section 2)

Thirteen of the 14 questions in section 2 were answered by 98.3% of participants (range 95.6-99.2%). For question 6, which only applied to patients who have ever received an ultrasound-guided injection data was available in 62,1% of surveys.

Figure 1 illustrates that each question reached an overall favourable response $\geq 80\%$. Table 1 shows the questions, the number and percentage of favourable responses and the confidence interval (CI). One can see that the highest favourable responses, over 95%, were for confidence with diagnosis and with the suggested therapeutic options, privacy during the examination, and sharing the information (questions 2,3,4,5,10 and 12). The lowest favourable response, 80.8%, was for the appropriateness of the waiting time until the MKS ultrasound is performed (question 9). Sixty-two point one percent (n=561) of the patients had at least one MSK ultrasound guided procedure and most of them (88.6%) favourably responded that ultrasound guided procedures are safer than non-guided ones (question 6).

The gender perspective analysis (table 2) found no significant differences when comparing male and female favourable responses for each of the 14 questions.

The education level analysis (table 3) found that patients with university level of education significantly responded more favourably than those with lower education level to when the rheumatologist ultrasonographer looks inside the joints, the disease is better understood (question 1). In addition, higher level of education was associated with almost no discomfort with the technique (question 7).

The MKS ultrasound frequency assessment analysis (table 4) found that patients who reported usual ultrasound examinations significantly responded more favourably than those who reported occasional examination to the following formulates: when the rheumatologist ultrasonographer looks inside the joints the disease is better understood, adequate waiting time between request and performance of the ultrasound exam, sufficient information about the procedure before the exam, sufficient information about the result of the ultrasound examination and the procedure to be followed and, importance that the attending rheumatologist performs the ultrasound assessment (questions 1,9,11,12,13).

The rheumatologist ultrasonographer analysis (table 5) showed that the aforementioned formulates (1,9,11,12,13) were also associated with significant more favourable responses when the attending

rheumatologist usually performs the ultrasound exam compared to when the attending rheumatologist sometimes performs the scan or when another rheumatologist from the same department performs the ultrasound exam.

The disease duration analysis found no significant differences when comparing favourable responses between patients diagnosed less than 2 years ago, between 2 to 5 years ago or more than 5 years ago for each of the 14 questions (data not shown).

Patients' voluntary written suggestions and opinions to each question of section 2 are described in Supplementary table 2. Most all opinions were positive.

Rheumatologist ultrasonographers characteristics and ultrasound implementation in clinical rheumatology (section 3)

Mean (SD; range) age of the 27 rheumatologist ultrasonographers was 47.3 (12; 27-62) years, 15 were men and 12 women. All worked as a rheumatologist during a median (IQR; range) of 22 (9.5-28; 1-31) years with a median (IQR) of 15 (3.8-22) years of experience in MSK ultrasonography. Twenty-four rheumatologist ultrasonographers (88.9%) performed the assessment during clinical visits. In addition, 18 (66.7%) had an intra-department consultation rheumatology ultrasound service and 4 (15%) rheumatologist ultrasonographers had an inter-department consultation service.

Discussion

This is the largest multicentre one country survey carried-out in patients with chronic joint diseases designed to assess their experience and perceived benefits with the use of MSK ultrasonography when performed by rheumatologist ultrasonographers in daily practice. There are no doubts that MSK ultrasound is well accepted and valued in this patient sample. Patients feel comfortable with joint positioning, use of gel and with the scanning time. They consider the room setting adequate. They believe that they receive sufficient information about the procedure before the scan and that their privacy is respected during the examen. They perceive that MSK ultrasonography helps not only their rheumatologist but also themselves to better understand their problem. Thus, they feel more confident with the offered diagnoses and/or therapeutic management plan particularly when the images are shown, and the results are shared with them. In addition, they believe that MSK ultrasonography helps them accept and comply with the proposed treatment. The possible reasons why the same questions (1,9,11,12,13) were answered significantly more favourably when patients were scanned by their attending rheumatologist and when patients considered that they were scanned normally denotes the impact of the rheumatologist ultrasonographer on patients' views regarding namely the perceived importance of having the scans done by their rheumatologist and the contribution that ultrasound plays to better understand their disease. Nevertheless, the responses of those patients who were only occasionally assessed by ultrasound in their clinical management or by another rheumatologist of the department than the usual one were also very favourable, which shows that patients appreciate the added value of this imaging tool also in these circumstances.

Several local small sample qualitative studies directed to investigate arthritic patients' (mainly RA) views of MSK ultrasonography have been published. Acebes et al. (n=43) [12] and Nensey et al. (n = 48) [13] confirmed that the MSK ultrasonography is well tolerated by the patients and that it adds more understanding to their medical condition. Joplin et al. [8] showed that sharing real-time MSK ultrasound

images of the clinically inflamed joints increases patient belief in the necessity of medication versus the concern about taking the medication in 18 patients with RA. Joshua et al. [7] showed that the incorporation of Doppler MSK ultrasonography into routine clinical practice in RA patients increased their understanding of their disease. Tan et al. [9] went a step further, showing that a MSK ultrasonography program as an intervention improved disease-modified anti-rheumatic drugs adherence in RA. In comparison with the aforementioned reports, the strengths of our study are the sample size that included many chronic arthropathies, the number of centres with integrated rheumatologic ultrasonography and the comprehensive assessment of patients' views.

In addition, several studies have shown that patients prefer MSK ultrasound guided procedures such as joint aspirations and injections over landmark guided ones [14,15]. Safety is very important for the patients; we showed that most do perceive that MSK ultrasound guided injections are safer than non-guided ones as previously reported by Osborne et al. [16].

Given the excellent results of the study, we were unable to detect patient-perceived areas for improvement in the management and performance of MSK ultrasonography in rheumatology. Though favourable responses were greater than 70% in all questions, waiting time for the ultrasound assessment was lower most probably due to the variability of the waiting lists in Spanish rheumatology departments. This could be improved by increasing the number of ultrasonographers and machines and/or the time devoted to rheumatological ultrasound within the rheumatology service offer. Most of the patients' free comments were also, positive. Some said that the examining room was small and poorly ventilated. Others suggested the use of simple language for better patients understanding. The latter two aspects should certainly be considered to improve our rheumatology patient care.

The main limitation of the study was that the attending rheumatologists or other rheumatologists from the same rheumatology department invited and enrolled their patient in the study which could have encouraged positive responses. An externally conducted survey either on-site or web-based could lower this anchoring bias. In addition, we did not use any method of random sampling, but for convenience we included the patients consecutively. These methodological strategies would have been a barrier to conducting the study for logistical or economic reasons and the best was to consecutively enrol and anonymously answer the survey. We managed to assess patients' views in a relatively large population coming from many rheumatology departments with integrated MSK ultrasonography and thus, our population may be representative of the target population.

It will be interesting to compare these Spanish results with future work in other countries to detect differences and areas for improvement. In addition, it will also be of interest to investigate the opinion of patients with other less severe conditions such as regional pain syndromes.

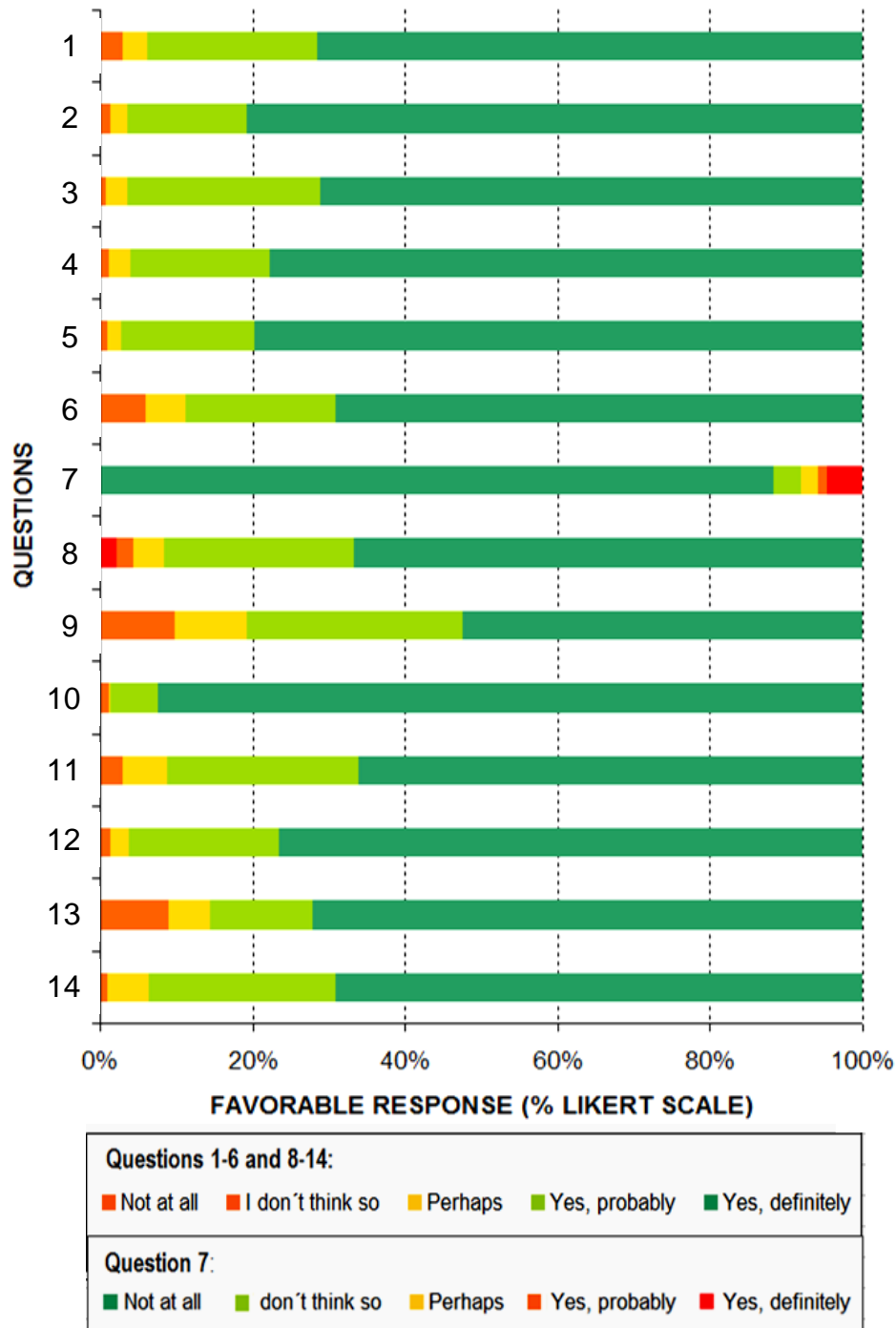
In conclusion, our encouraging patient-centered results may be useful in facilitating the implementation of rheumatological ultrasound in rheumatology care worldwide. Hopefully, this information will be instrumental in informing future patient-centered points-to-consider or even recommendations for integrating MSK ultrasonography in rheumatology services.

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Figure 1: Coloured graphic representing patient's responses to each question of section 2 about management, performance, and perceived usefulness of MSK ultrasonography.



5 point-Liker scale: score 1 (Not at all), score 2 (I don't think so), score 3 (Perhaps), score 4 (Yes, probably), score 5 (Yes, definitely). Favourable responses (score ≥ 4 on Liker scale for questions 1-6 and 8-14 and ≤ 2 for question 7, in $>70\%$ of patients) are represented in green (light green and dark green) on the coloured graphic.

Table 1. Global patients' favourable responses (number and %): ≥ 4 by at least 70% of the patients for all questions except for question 7 in which ≤ 2 by at least 70% of the patients.

	n	%	95%CI
1. Do you think that when your rheumatologist performs ultrasound scans of your joints to look inside of them, your disease is better understood?	836 /892	93.7%	92.9% - 95.2%
2. Do you think that when your rheumatologist performs ultrasound scans of your joints to look inside of them, you are more confident with the given diagnosis?	861 /895	96.2%	94.7% - 97.3%
3. Do you think that when your rheumatologist performs ultrasound scans of your joints to look inside of them, she/he can choose more appropriately the form of treatment?	860 /893	96.3%	94.8% - 97.4%
4. Do you think that when your rheumatologist performs ultrasound scans of your joints to look inside of them, you are more confident with the management plan offered?	859 /895	96.0%	94.5% - 97.2%
5. Do you think that when your rheumatologist explains and shares the ultrasound images or result of the scan, you are more confident with the diagnosis and/or the therapeutic options offered to you?	868 /893	97.2%	95.9% - 98.2%
6. If you have ever had an ultrasound-guided injection, please answer this question: Do you think that when your rheumatologist uses ultrasound to guide injections into your joints, it increases the safety of the procedure compared to injections without ultrasound guidance?	497 /561	88.6%	85.7% - 91.1%
7. Do you feel uncomfortable when your rheumatologist performs an ultrasound examination because of the required time needed, the joint positions or gel?	824 /897	91.9%	90.0% - 93.1%
8. Do you think that the ultrasound performed by your rheumatologist helps you to accept and comply with the proposed therapy?	818 /895	91.4%	89.3% - 93.1%
9. Do you consider that the waiting time between the request for the ultrasound examination and the performance of the scan was adequate?	698 /864	80.8%	78.0% - 83.4%
10. Do you consider that your privacy was adequately respected during the ultrasound examination by the healthcare staff?	873 /886	98.5%	97.5% - 99.2%
11. Do you feel that you received sufficient information about the procedure before the ultrasound examination?	832 /889	93.6%	91.8% - 95.1%
12. Do you feel that you received sufficient information about the result of the ultrasound examination and the procedure to be followed after the scan?	849 /882	96.3%	94.8% - 97.4%
13. Do you consider it important that your rheumatologist is the one who performs the ultrasound examination?	759 /888	85.5%	83.0% - 87.7%
14. Do you consider the ultrasound examination room setting (space, layout, cleanliness, ventilation) adequate?	829 /887	93.5%	91.6% - 95.0%

Table 2: Gender perspective analysis, number (%) of patients with favourable responses (≥ 4 by at least 70% of the patients for all questions except for question 7 in which ≤ 2 by at least 70% of the patients).

	Men	Women	p
1. Do you think that when your rheumatologist performs ultrasound scans of your joints to look inside of them, your disease is better understood?	224 (94.2%)	609 (93.3%)	0.370
2. Do you think that when your rheumatologist performs ultrasound scans of your joints to look inside of them, you are more confident with the given diagnosis?	234 (98.7%)	624 (95.3%)	0.016
3. Do you think that when your rheumatologist performs ultrasound scans of your joints to look inside of them, she/he can choose more appropriately the form of treatment?	233 (98.3%)	624 (95.6%)	0.069
4. Do you think that when your rheumatologist performs ultrasound scans of your joints to look inside of them, you are more confident with the management plan offered?	229 (96.6%)	627 (95.7%)	0.547
5. Do you think that when your rheumatologist explains and shares the ultrasound images or result of the scan, you are more confident with the diagnosis and/or the therapeutic options offered to you?	230 (97.5%)	635 (97.1%)	0.772
6. If you have ever had an ultrasound-guided injection, please answer this question: Do you think that when your rheumatologist uses ultrasound to guide injections into your joints, it increases the safety of the procedure compared to injections without ultrasound guidance?	143 (89.9%)	351 (88.0%)	0.510
7. Do you feel uncomfortable when your rheumatologist performs an ultrasound examination because of the required time needed, the joint positions or gel?	215 (90.7%)	606 (92.2%)	0.464
8. Do you think that the ultrasound performed by your rheumatologist helps you to accept and comply with the proposed therapy?	219 (92.8%)	596 (90.8%)	0.362
9. Do you consider that the waiting time between the request for the ultrasound examination and the performance of the scan was adequate?	190 (83.0%)	506 (80.1%)	0.338
10. Do you consider that your privacy was adequately respected during the ultrasound examination by the healthcare staff?	229 (98.3%)	641 (98.6%)	0.753
11. Do you feel that you received sufficient information about the procedure before the ultrasound examination?	222 (95.3%)	607 (93.0%)	0.215
12. Do you feel that you received sufficient information about the result of the ultrasound examination and the procedure to be followed after the scan?	224 (97.0%)	622 (96.0%)	0.500
13. Do you consider it important that your rheumatologist is the one who performs the ultrasound examination?	205 (88.0%)	551 (84.5%)	0.197
14. Do you consider the ultrasound examination room setting (space, layout, cleanliness, ventilation) adequate?	214 (91.8%)	613 (94.2%)	0.216

Table 3 Education level analysis, number (%) of patients with favourable responses (≥ 4 by at least 70% of the patients for all questions except for question 7 in which ≤ 2 by at least 70% of the patients).

	Basic	Secondary	University	P
1. Do you think that when your rheumatologist performs ultrasound scans of your joints to look inside of them, your disease is better understood?	370 (91.6%)	237 (92.6%)	216 (99.1%)	<0.0001
2. Do you think that when your rheumatologist performs ultrasound scans of your joints to look inside of them, you are more confident with the given diagnosis?	389 (95.8%)	248 (96.9%)	210 (95.9%)	0.768
3. Do you think that when your rheumatologist performs ultrasound scans of your joints to look inside of them, she/he can choose more appropriately the form of treatment?	387 (96.3%)	249 (96.9%)	211 (95.9%)	0.843
4. Do you think that when your rheumatologist performs ultrasound scans of your joints to look inside of them, you are more confident with the management plan offered?	396 (97.5%)	245 (95.3%)	204 (93.6%)	0.050
5. Do you think that when your rheumatologist explains and shares the ultrasound images or result of the scan, you are more confident with the diagnosis and/or the therapeutic options offered to you?	390 (96.8%)	251 (97.7%)	213 (97.3%)	0.794
6. If you have ever had an ultrasound-guided injection, please answer this question: Do you think that when your rheumatologist uses ultrasound to guide injections into your joints, it increases the safety of the procedure compared to injections without ultrasound guidance?	225 (84.9%)	154 (91.1%)	112 (92.6%)	0.040
7. Do you feel uncomfortable when your rheumatologist performs an ultrasound examination because of the required time needed, the joint positions or gel?	357 (87.7%)	241 (94.5%)	213 (96.4%)	<0.0001
8. Do you think that the ultrasound performed by your rheumatologist helps you to accept and comply with the proposed therapy?	379 (93.3%)	236 (92.9%)	191 (86.4%)	0.008
9. Do you consider that the waiting time between the request for the ultrasound examination and the performance of the scan was adequate?	331 (84.4%)	198 (79.2%)	158 (76%)	0.032
10. Do you consider that your privacy was adequately respected during the ultrasound examination by the healthcare staff?	390 (97.3%)	254 (99.6%)	215 (99.5%)	0.021
11. Do you feel that you received sufficient information about the procedure before the ultrasound examination?	372 (92.8%)	241 (94.5%)	207 (94.5%)	0.570
12. Do you feel that you received sufficient information about the result of the ultrasound examination and the procedure to be followed after the scan?	386 (96.7%)	245 (96.1%)	204 (95.3%)	0.678
13. Do you consider it important that your rheumatologist is the one who performs the ultrasound examination?	357 (88.8%)	212 (83.1%)	179 (82.5%)	0.043
14. Do you consider the ultrasound examination room setting (space, layout, cleanliness, ventilation) adequate?	386 (96%)	233 (92.1%)	197 (90.4%)	0.014

Table 4. MSK ultrasound frequency assessment analysis, number (%) of patients with favourable responses (≥ 4 by at least 70% of the patients for all questions except for question 7 in which ≤ 2 by at least 70% of the patients). Category Occasional: occasional and hardly ever. Category Frequently: always, often and sometimes.

	Occasional	Frequently	<i>p</i>
1. Do you think that when your rheumatologist performs ultrasound scans of your joints to look inside of them, your disease is better understood?	387 (90.6%)	436 (96.7%)	<0.0001
2. Do you think that when your rheumatologist performs ultrasound scans of your joints to look inside of them, you are more confident with the given diagnosis?	404 (94.6%)	444 (98.0%)	0.007
3. Do you think that when your rheumatologist performs ultrasound scans of your joints to look inside of them, she/he can choose more appropriately the form of treatment?	406 (95.1%)	440 (97.3%)	0.078
4. Do you think that when your rheumatologist performs ultrasound scans of your joints to look inside of them, you are more confident with the management plan offered?	404 (94.8%)	440 (96.9%)	0.119
5. Do you think that when your rheumatologist explains and shares the ultrasound images or result of the scan, you are more confident with the diagnosis and/or the therapeutic options offered to you?	409 (96.2%)	445 (98.0%)	0.112
6. If you have ever had an ultrasound-guided injection, please answer this question: Do you think that when your rheumatologist uses ultrasound to guide injections into your joints, it increases the safety of the procedure compared to injections without ultrasound guidance?	193 (83.9%)	295 (91.9%)	0.004
7. Do you feel uncomfortable when your rheumatologist performs an ultrasound examination because of the required time needed, the joint positions or gel?	394 (91.8%)	418 (92.3%)	0.812
8. Do you think that the ultrasound performed by your rheumatologist helps you to accept and comply with the proposed therapy?	383 (89.5%)	420 (92.9%)	0.072
9. Do you consider that the waiting time between the request for the ultrasound examination and the performance of the scan was adequate?	300 (70.9%)	385 (90.2%)	<0.0001
10. Do you consider that your privacy was adequately respected during the ultrasound examination by the healthcare staff?	419 (98.6%)	440 (98.4%)	0.851
11. Do you feel that you received sufficient information about the procedure before the ultrasound examination?	379 (89.2%)	440 (97.8%)	<0.0001
12. Do you feel that you received sufficient information about the result of the ultrasound examination and the procedure to be followed after the scan?	395 (94.0%)	441 (98.4%)	0.001
13. Do you consider it important that your rheumatologist is the one who performs the ultrasound examination?	318 (75.2%)	429 (95.1%)	<0.0001
14. Do you consider the ultrasound examination room setting (space, layout, cleanliness, ventilation) adequate?	392 (92.2%)	425 (94.9%)	0.113

Table 5. Rheumatologist ultrasonographer analysis (i.e., whether it was their usual rheumatologist or another rheumatologist who performed their ultrasound assessments), number (%) of patients with favourable responses (≥ 4 by at least 70% of the patients for all questions except for question 7 in which ≤ 2 by at least 70% of the patients).

	No	Occasionally	Yes	p
1. Do you think that when your rheumatologist performs ultrasound scans of your joints to look inside of them, your disease is better understood?	236 (88.7%)	19 (86.3%)	577 (96.3%)	<0.0001
2. Do you think that when your rheumatologist performs ultrasound scans of your joints to look inside of them, you are more confident with the given diagnosis?	248 (93.2%)	20 (90.9%)	589 (97.8%)	0.002
3. Do you think that when your rheumatologist performs ultrasound scans of your joints to look inside of them, she/he can choose more appropriately the form of treatment?	250 (94.0%)	22 (99.9%)	583 (97.1%)	0.080
4. Do you think that when your rheumatologist performs ultrasound scans of your joints to look inside of them, you are more confident with the management plan offered?	247 (93.2%)	22 (100%)	585 (97.0%)	0.032
5. Do you think that when your rheumatologist explains and shares the ultrasound images or result of the scan, you are more confident with the diagnosis and/or the therapeutic options offered to you?	251 (94.4%)	22 (100%)	590 (98.3%)	0.008
6. If you have ever had an ultrasound-guided injection, please answer this question: Do you think that when your rheumatologist uses ultrasound to guide injections into your joints, it increases the safety of the procedure compared to injections without ultrasound guidance?	101 (82.9%)	9 (81.8%)	284 (90.4%)	0.041
7. Do you feel uncomfortable when your rheumatologist performs an ultrasound examination because of the required time needed, the joint positions or gel?	242 (90.3%)	21 (95.5%)	557 (92.5%)	0.543
8. Do you think that the ultrasound performed by your rheumatologist helps you to accept and comply with the proposed therapy?	241 (90.1%)	19 (86.4%)	554 (92.1%)	0.341
9. Do you consider that the waiting time between the request for the ultrasound examination and the performance of the scan was adequate?	184 (68.4%)	16 (72.8%)	494 (81.4%)	<0.0001
10. Do you consider that your privacy was adequately respected during the ultrasound examination by the healthcare staff?	260 (98.5%)	20 (95.2%)	588 (98.6%)	0.306
11. Do you feel that you received sufficient information about the procedure before the ultrasound examination?	229 (85.1%)	18 (82.8%)	580 (95.4%)	<0.0001
12. Do you feel that you received sufficient information about the result of the ultrasound examination and the procedure to be followed after the scan?	240 (89.6%)	20 (90.9%)	584 (96.1%)	<0.0001
13. Do you consider it important that your rheumatologist is the one who performs the ultrasound examination?	157 (58.4%)	17 (77.6%)	581 (95.6%)	<0.0001
14. Do you consider the ultrasound examination room setting (space, layout, cleanliness, ventilation) adequate?	243 (91.7%)	21 (100%)	560 (94.0%)	0.278