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Patients' self-reported medical care for low back pain: a nationwide population-based study

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ABSTRACT

Objectives To estimate the prevalence of medical care-seeking among adults with low back pain (LBP) and to characterise and compare use of diagnostic procedures and medical management between primary and secondary care.

Design Cross-sectional study.

Setting Data from the EpiReumaPt, a nationwide population-based study conducted in Portugal including a representative sample of non-institutionalised adults (n=10 661) stratified by administrative territorial units was analysed.

Participants Individuals who self-reported history of LBP within the previous 12 months (n=6434) and sought medical care for this problem in the same period (n=2618).

Outcome measures Patients' self-reported diagnostic workup and management procedures performed by medical care for LBP collected through a structured questionnaire. Medical care procedures were stratified by level of care.

Results The prevalence of medical care-seeking for LBP was 38.0% (95% CI 35.9% to 40.1%). Primary care in isolation (45.3%) was the most sought level of care. Emergency departments (25.9%) and orthopaedics (19.4%) were the most sought secondary medical specialties. Several pathoanatomical diagnoses were used, supported by laboratory or imaging tests (91.1%). Disc herniation (20.4%) and osteoarthritis (19.7%) were the most frequent diagnoses, and X-ray (63.7%) was the most frequent diagnostic procedure self-reported by individuals. Most (75.1%) reported being treated for LBP: 80.4% with oral medication and 49.9% with injectables. The mean duration of pharmacological treatment was 104.24 (SD, 266.80) days. The use of pathoanatomical diagnoses, laboratory or imaging tests, and pharmacological treatments were generally more frequent for secondary care ($p<0.05$). Approximately one-quarter of individuals (24.5%) reported seeking care from additional healthcare providers, physiotherapists (66.9%) were the most frequent.

Conclusions Medical care for LBP is frequent and associated with high levels of pathoanatomical diagnoses, imaging and laboratory tests and pharmacological therapy in both primary and secondary care settings. Funding and delivery actions should be prioritised to assure appropriate care for LBP.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ This study was conducted under the scope of EpiReumaPt, a Portuguese population-based study including a representative sample of 10 661 non-institutionalised Portuguese adults.
⇒ Diagnostic and medical management procedures for LBP were detailed and characterised based on self-reported data collected at the patient level.
⇒ The use of data collected at the patients' level allowed a detailed characterisation of care provided at a whole healthcare system and by specific levels (ie, primary and secondary care) using comparable data.
⇒ Confounding factors regarding the interpretation and memory of individuals need to be considered in the interpretation of the results.

INTRODUCTION

Low back pain (LBP) is among the top 10 leading global causes of disability-adjusted life years (DALYs).[1] The increasing world population and average life expectancy triggered a substantial growth in LBP-related burden, which is challenging healthcare systems worldwide.[2]

Described as a long-lasting condition with a variable clinical course, most episodes of LBP have a short duration, favourable prognosis and non-specific nature, meaning that an identifiable pathoanatomical or nociceptive source of pain cannot be accurately determined.[3–5] Thus, it is recommended that most patients receive minimal or no formal care for LBP and that healthcare should be reserved for the minority who require specialised care.[6–8] For those in need, guidelines recommend that LBP management should be guided by a biopsychosocial framework of patient education, exercise and self-management, avoiding excessive medical solutions.[9–11] Despite these recommendations, patients frequently seek healthcare for LBP from a wide range of specialties at both primary and secondary levels of care.[12] The

same variety of approaches has been found to diagnose and manage LBP.[13–17]

Recently, the WHO stated that funding and delivery actions by governance are essential for shifting healthcare resources from unnecessary and fragmented care to cost-effective management and prevention strategies.[8] Studies that estimate the prevalence of healthcare seeking and characterise diagnostic and management procedures in real-world contexts have the potential to alert governance and trigger planning and adoption of high-value care within healthcare systems. To date, studies have focused this characterisation within specific healthcare contexts using medical records consultation, which may not allow an in-depth and full description of the situation.[13–17] By contrast, population-based studies have the potential to allow broad-spectrum characterisation of care provided at different levels and systems of healthcare using comparable data collected at the patient level. This study aimed to estimate the prevalence of medical care seeking for LBP and to characterise and compare diagnostic workup and management procedures between primary and secondary care contexts in the adult Portuguese population, based on patients' self-reported data.

MATERIALS AND METHODS

This study was conducted under the scope of EpiReumaPt, a national, cross-sectional, population-based study conducted from September 2011 to December 2013. The main objective of EpiReumaPt was to estimate the prevalence of rheumatic and musculoskeletal diseases (RMDs) in the adult Portuguese population (>18 years old (y.o.)). EpiReumaPt included a representative sample of non-institutionalised Portuguese adults who provided written consent to participate in the study (10 661 individuals). The first stage (RMDs screening) aimed to characterise the Portuguese adult population and screen for the presence of RMDs. The selection of participants was performed through a multistage random sampling, considering the stratification of the Portuguese statistic administrative territorial units (Nomenclature of Territorial Units for Statistics (NUTS)) in the 2001 CENSUS and the size of the population, so that each stratum had a proportional number of participants with the actual distribution of population. A random route methodology was used to randomly select individuals' households, to whom a survey was conducted through a face-to-face interview by a team of interviewers (ie, non-physicians trained for this purpose), aiming to characterise the Portuguese adult population and screen individuals for the presence of an RMD. In the second stage (RMD diagnosis), all individuals who screened positive for at least one RMD and a random sample of 20% of individuals without rheumatic symptoms were invited to participate and, consequently, be observed by a rheumatologist to establish the RMD diagnosis. Lastly, in the third stage (RMD diagnostic validation), the RMD diagnosis was validated by a team of three experienced rheumatologists who reviewed all clinical data and used previously validated criteria for the considered RMD. A detailed description of study design, sample selection, and recruitment is provided elsewhere.[18] For the current study, data collected during the first stage were considered (figure 1).

Study sample

The population of interest for this study was all adults who self-reported a history of LBP within the 12 months preceding the survey. LBP was defined as pain in the back area from the lower margin of the12th rib to the lower

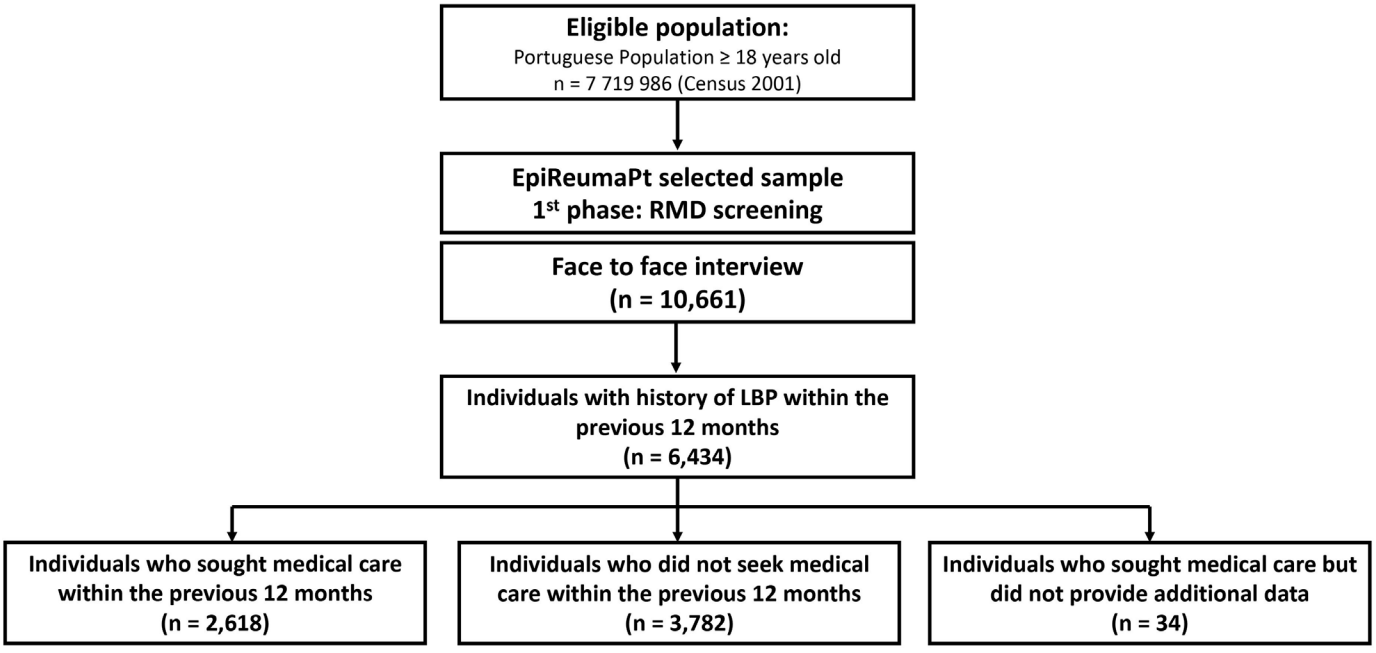

Figure 1 Study design flow chart. LBP, low back pain; RMD, rheumatic and musculoskeletal disease.

gluteal folds, with or without pain referred to the lower limbs.[19]

Case definition

History of medical care seeking for LBP within the previous 12 months was self-reported by the individuals who constitute the study sample ('During the last 12 months, did you seek medical care for your LBP?' (yes/no)).[20] For individuals who reported seeking medical care, the level of care was explored for further analysis.

Measurement, assessment and instruments

Data on basic sociodemographic and clinical characteristics of individuals who sought medical care for LBP were collected. Specifically, quality of life (Short Form Health Survey 36), self-reported comorbidities (ie, rheumatic, pulmonary, cardiac, gastrointestinal, neurological, mental, thyroid, and parathyroid diseases, hypertension, diabetes, dyslipidaemia, allergies, cancer, hypogonadism, hyperuricaemia, and renal colic (yes/no)), and LBP-related characteristics, such as number of days with pain and disability within the previous 12 months, and red flags (ie, progressive, slow, or insidious onset; relief with exercise; relief with rest; occurs during the night and relieves in the morning; pain awakening in the second half of the night; morning back stiffness; pain in gluteal region, alternating left and right; pain control within 24–48 hours after taking non-steroidal anti-inflammatory drug; unexplained weight loss (>4.5 kg in 6 months); constant and progressive LBP; previous infection; previous intravenous treatment; transplantation; persistent limitation of mobility; family history of rheumatoid arthritis or osteoporosis; LBP with urinary retention or incontinence; faecal incontinence; tingling in the anal or genital region or lower limbs; and progressive weakness of the legs or walking difficulties (yes/no)), were recorded.

Information about the type of medical specialty from which care was sought was collected by asking 'what kind of physician did you seek to and how many times did you do it?' with the following response options (yes/no): emergency department, general practitioner (GP), internal medicine, orthopaedist, physical medicine and rehabilitation, rheumatologist, neurologist/neurosurgeon, and other (open question). Individuals were then asked about the LBP-related diagnosis made by physicians ('did this/these physician(s) make a diagnosis for your LBP?", yes/no) with the following response options: mechanical/muscle-related LBP, sciatica, osteoarthritis, spondylitis/ankylosing spondylitis, infection/spondylodiscitis, osteoporosis without fracture, osteoporosis with fracture, disc herniation, tumour/metastasis, scoliosis, did not make diagnosis, and other (open question). To analyse the use of diagnostic procedures, individuals were asked 'which exams were used to support diagnosis?' with the following response options (yes/no): clinical history/observation, blood testing, urinalysis, X-ray, CT scanning, MRI, bone density testing, bone scanning, or other (open question). To estimate the prevalence of and characterise medical treatment for LBP, individuals were asked questions about whether they received treatment for LBP (yes/no), the duration (days) of treatment, and the route of treatment administration (injectable or oral medication/pills, yes/no). In addition to the specified response options, every question presented also had an 'I don't know/no answer' option.

Finally, information on care seeking from other healthcare providers was obtained by asking individuals 'during the last year, did you ever seek any of the following care providers: physiotherapist, psychologist, complementary medicine (acupuncturist, homeopaths, osteopaths, naturopaths, herbalists, chiropractors, herbalists, and healers), or others?' (yes/no). This question was not specific to LBP.

Statistical analysis

Prevalence and respective CIs of medical care seeking, were computed as weighted proportions, in order to take into account the sample design—stratified two-stage cluster sample design, so the representativity of study sample could be guaranteed.[18] To do this, weights were calibrated considering the age, gender, size of locality and NUTSII of each stratum of participants so the known population totals for the crossing margins of these four variables could be reproduced.[18] This was the same approach used to estimate the prevalence of RMDs and chronic LBP in EpiReumaPt.[19 21] Descriptive statistics were used to characterise individuals who sought medical care. Categorical variables are presented as absolute frequency and proportion, and continuous variables are presented as mean and SD.

Descriptive statistics were also used to characterise medical care seeking and respective diagnostic and management procedures considering both the entire sample and subgroups according to the level of care sought (primary, secondary, or multiple care). Individuals who reported seeking care from only GPs were classified as the 'primary care only' (PCO) subgroup, individuals who reported seeking care from any medical specialty except GPs were classified as the 'secondary care only' (SCO) subgroup, and individuals who reported seeking care from both GPs and other medical specialties were classified as the 'multiple care' (MC) subgroup. Answers to 'other' options were analysed individually accordingly to the same classification criteria. Individuals who selected the 'I don't know/no answer' option in isolation or complementarily with other option(s) were considered 'missing' for this variable to employ a conservative approach. Additional variables were computed following the same conservative approach. Regarding diagnostic procedures, an aggregating variable for all laboratory or imaging tests was created including all individuals who selected at least one of the tests presented. Aggregating variables were also created to estimate the type of diagnostic procedure (only clinical history/observation, only laboratory or imaging tests, or both) and analyse the type

Table 1 Prevalence of medical care-seeking for Low back pain within the previous 12 months by gender and age

	Prevalence (95% CI) n=6400	Women (95% CI) n=4349	Men (95% CI) n=2051
Total (n=6400)	38.0% (35.9 to 40.1%)	42.6% (40.1 to 45.1%)	31.0% (27.5 to 34.8%)
Age			
18–25 y.o. (n=310)	22.4% (17.6 to 28.0%)	27.2% (20.7 to 34.8%)	15.9% (9.8 to 24.6%)
26–35 y.o. (n=573)	29.9% (22.6 to 38.4%)	29.6% (23.7 to 36.2%)	30.3% (17.1 to 47.8%)
36–45 y.o. (n=1043)	36.0% (32.4 to 39.8%)	39.6% (34.7 to 44.8%)	30.9% (25.6 to 36.6%)
46–55 y.o. (n=1161)	39.8% (35.6 to 44.2%)	43.4% (37.2 to 49.8%)	34.9% (29.1 to 41.2%)
56–65 y.o. (n=1259)	47.2% (41.9 to 52.2%)	54.2% (48.0 to 60.2%)	36.3% (28.7 to 44.7%)
66–75 y.o. (n=1185)	47.6% (42.8 to 52.5%)	55.0% (49.0 to 60.9%)	33.2% (27.8 to 39.1%)
76–85 y.o. (n=758)	42.1% (37.0 to 47.5%)	47.5% (40.7 to 54.4%)	29.9% (23.6 to 37.1%)
>86 y.o. (n=145)	23.1% (14.5 to 34.8%)	22.3% (12.5 to 36.7%)	25.6% (13.4 to 43.4%)

. y.o, years old.

of medical treatment received (only oral medication/pills, only injectable, or both).

Statistical inference tests were used to compare the rate of medical care procedures between different levels of care (PCO vs SCO, PCO vs MC, SCO vs MC). For continuous variables, given the non-normality of data (Kolmogorov-Smirnov test) the non-parametric test, Mann-Whitney Test, was used. For categorical variables, χ^2 or Fisher's exact tests were used accordingly with the Cochran Criteria. For small samples where these criteria were not met, Fisher's exact tests were used instead. A post-hoc test (Bonferroni correction) was performed on every pairwise comparison to account for multiple hypothesis testing. The significance level was set at 5%. All analyses were performed using Stata IC (Stata Statistical Software: Release 16, College Station, TX: StataCorp LLC, 2019, USA).

Patient and public involvement

Patients or the public were not involved in the design, or conduct, or reporting, or dissemination plans of the current work.

RESULTS

Prevalence of medical care seeking for LBP

The prevalence of medical care seeking for LBP in the adult Portuguese population was 38.0% (95% CI 35.9 to 40.1%) (table 1). Individuals who sought medical care (n=2618) were mainly middle aged (57.24 (15.75) y.o.), women (n=1953, 74.6%), and with low educational status (0 to 4 years; n=1474, 56.7%). Regarding LBP-specific characteristics, individuals reported a mean of 117.89 (153.66) and 33.73 (90.45) days of pain and disability during the previous 12 months, respectively, and a mean number of 6.24 (3.70) red flags (table 2).

Medical care-seeking and diagnostic and management procedures for LBP

Table 3 shows characteristics of medical care-seeking and respective diagnosis and management procedures for LBP based on individuals' self-reported data. The most frequently sought level of medical care for LBP was PCO (n=1143, 45.3%) followed by MC (n=725, 28.8%) and SCO (n=653, 25.9%). Emergency departments (n=677, 25.9%) and orthopaedics (508, 19.4%) were the most frequently sought medical specialties of secondary care for LBP.

Disc herniation (n=533, 20.4%) and osteoarthritis (n=515, 19.7%) were reported by individuals as the main diagnoses made by medical care provider for their LBP. The use of these and other pathoanatomical explanations for LBP was more frequent when secondary care (SCO or MC) was received compared with PCO ($p<0.05$). X-rays (n=1668, 63.7%), clinical history/observation (n=1162, 44.4%), blood testing (n=999, 38.2%), urinalysis (n=900, 34.4%), and CT scanning (n=849, 32.4%) were described by individuals as the most common diagnostic procedures used by physicians to diagnose LBP. Most (n=2063, 91.1%) individuals reported that physicians based their diagnosis on a laboratory or imaging test, and the use of these procedures was higher in the MC subgroup than in the SCO and PCO subgroups ($p<0.001$).

Regarding management procedures, 75.1% of individuals self-reported that they were treated for LBP by a physician for a mean duration of 104.24 (266.80) days. The proportion of individuals who were treated and for longer periods of time was higher for the secondary care (SCO and MC) compared with primary care (PCO, $p<0.001$) and for the MC subgroup compared with the PCO ($p<0.001$) and SCO ($p=0.005$) subgroups, respectively. Most individuals were treated with oral medication/pills (n=1559, 80.4%), and fewer individuals were treated with injectables (n=969, 49.9%).

In addition to medical care, 637 (24.5%) individuals reported having sought care from additional healthcare providers within the previous 12 months. Physiotherapists (n=426, 66.9%) were the most frequent.

DISCUSSION

This study aimed to estimate the prevalence of and characterise medical care seeking for LBP in the adult

Table 2 Sociodemographic and clinical characteristics of individuals seeking medical care for low back pain (LBP) within the previous 12 months

Sociodemographic characteristics	
Age, years (mean (SD))	57.24 (15.75)
Women (%)	1953 (74.6%)
Ethnicity (%)	
Caucasian	2554 (97.9%)
Other	54 (2.1%)
Education level (%)	
>12 years	264 (10.2%)
10–12 years	336 (12.9%)
5–9 years	526 (20.2%)
0–4 years	1474 (56.7%)
Marital status (%)	
Single	269 (10.3%)
Married	1580 (60.4%)
Divorced	219 (8.4%)
Other	549 (21.0%)
Employment status (%)	
Full-time employed	753 (29.1%)
Unemployed	273 (10.6%)
Retired	1116 (43.1%)
Other	445 (17.2%)
Clinical characteristics	
Quality of life (mean (SD))	
SF-36 Physical Health	39.01 (13.35)
SF-36 Mental Health	49.42 (11.90)
Self-reported comorbidities (%)	
Rheumatic diseases	1369 (54.5%)
Hypertension	1119 (43.0%)
Diabetes	406 (15.6%)
Dyslipidaemia	1127 (43.6%)
Pulmonary disease	227 (8.7%)
Cardiac disease	498 (19.2%)
Gastrointestinal disease	733 (28.3%)
Neurological disease	148 (5.7%)
Allergy	701 (27.0%)
Mental disease	660 (25.4%)
Cancer	145 (5.6%)
Thyroid and parathyroid disease	403 (15.6%)
Hypogonadism	37 (1.5%)
Hyperuricaemia	244 (9.6%)
Renal colic	373 (14.5%)
No. of comorbidities (0–15) (mean (SD))	3.13 (2.26)
LBP-related clinical characteristics	
Time (days) with pain in the previous 12 months (mean (SD))	117.89 (153.66)
Time (days) with disability in the previous 12 months (mean (SD))	33.73 (90.45)
Red flags (%)	
Progressive, slow, or insidious onset	1228 (69.7%)
Relief with exercise	618 (37.5%)
Relief with rest	689 (38.7%)
Occurs during the night and relieves in the morning	1017 (55.2%)
Pain awakening in the second half of the night	1168 (63.4%)
Morning back stiffness	963 (52.6%)
Pain in gluteal region, alternating left and right	1348 (74.0%)
Pain control within 24–48 hours after taking NSAIDs	918 (71.8%)
Unexplained weight loss (>4.5 kg in 6 months)	254 (9.9%)
Constant and progressive LBP	1454 (56.7%)
Previous infection	368 (15.2%)
Previous intravenous treatment	872 (35.2%)
Transplantation	25 (1.0%)
Persistent limitation of mobility	1254 (48.4%)
Family history of rheumatoid arthritis or osteoporosis	1100 (50.4%)
LBP with urinary retention or incontinence	332 (13.2%)
Faecal incontinence	120 (4.7%)
Tingling in the anal or genital region or lower limbs	1028 (39.7%)
Progressive weakness of the legs or walking difficulties	1029 (39.6%)
No. of red flags (mean (SD))	6.24 (3.70)

Note: sample size is not constant due to missing data: ethnicity (n=2608); education level (n=2600); marital status (n=2617); employment status (n=2587); SF-36 Physical Health (n=2593); SF-36 Mental Health (n=2593); rheumatic diseases (n=2510); hypertension (n=2601); diabetes (n=2603); dyslipidaemia (n=2583); pulmonary disease (n=2598); cardiac disease (n=2589); gastrointestinal disease (n=2592); neurological disease (n=2595); allergy (n=2598); mental disease (n=2598); cancer (n=2599); thyroid and parathyroid disease (n=2584); hypogonadism (n=2544); hyperuricaemia (n=2553); renal colic (n=2575); time (days) within the previous 12 months not performing daily activities due to LBP (n=2588); progressive, slow, or insidious onset (n=1763); relief with exercise (n=1649); relief with rest (n=1782); occurs during the night and relieves in the morning (n=1843); pain awakening in the second half of the night (n=1842); morning back stiffness (n=1830); pain in gluteal region, alternating left and right (n=1821); previous anti-inflammatory therapy (n=1725); pain control with NSAID therapy within 24–48 hour (n=1278); unexplained weight loss (>4.5 kg in 6 months) (n=2564); constant and progressive LBP (n=2563); previous infection (n=2414); previous intravenous treatment (n=2475); transplantation (n=2609); persistent limitation of mobility (n=2589); family history of rheumatoid arthritis or osteoporosis (n=2181); LBP with urinary retention or incontinence (n=2507); faecal incontinence (n=2558); tingling in the anal or genital region or lower limbs (n=2588); progressive weakness of the legs or walking difficulties (n=2600). NSAID, non-steroidal anti-inflammatory drug; SF36, Short Form Health Survey 36.

Portuguese population. To the best of our knowledge, this is the first study providing a broad-spectrum characterisation of diagnostic and medical management procedures for LBP in primary and secondary care settings using self-reported data collected at the patient level from a nationwide population-based study.

We found that 38.0% (35.9%–40.1%) of adults in Portugal sought medical care for LBP, results that are in line with the CI of prevalence found for adults across Europe (48%, 33%–63%) in a recent systematic review.[12] Despite this, the overall burden of LBP is higher in Portugal (5.20% of total DALYs) compared with Europe (4.15% of total DALYs), indicating the necessity of prioritising discussions about this problem in Portugal.[1]

Table 3 Characteristics of medical care-seeking and respective diagnostic and management procedures for low back pain (LBP)

	All (n=2618)	PCO (n=1143)	SCO (n=653)	MC (n=725)	PCO versus SCO p value	PCO versus MC p value	SCO versus MC p value
Medical specialist sought for LBP (%)							
GP	1876 (71.7%)	1143 (100.0%)	0 (0.0%)	725 (100.0%)		–	–
Emergency department	677 (25.9%)	–	266 (40.7%)	411 (56.7%)	–	–	**<0.001***
Orthopaedist	508 (19.4%)	–	228 (34.9%)	280 (38.6%)	–	–	0.999*
Rheumatologist	237 (9.1%)	–	115 (17.6%)	122 (16.8%)	–	–	0.999*
Physical medicine and rehabilitation	205 (7.8%)	–	59 (9.0%)	146 (20.1%)	–	–	**<0.001***
Neurologist/neurosurgeon	159 (6.1%)	–	69 (10.6%)	90 (12.4%)	–	–	0.999*
Internal medicine	54 (2.1%)	–	10 (1.5%)	44 (6.1%)	–	–	**<0.001***
Other specialty	111 (4.2%)	–	45 (6.9%)	66 (9.1%)	–	–	0.999*
No. of times seeking LBP-related medical care	4.66 (10.00)	2.60 (6.43)	3.30 (7.11)	9.56 (14.69)	0999†	**<0.001†**	**<0.001†**
LBP-related diagnosis (%)							
Mechanical/muscle-related LBP	417 (15.9%)	144 (12.6%)	119 (18.2%)	134 (18.5%)	**<0.001***	**<0.001***	0.999*
Disc herniation	533 (20.4%)	170 (14.9%)	144 (22.1%)	210 (29.0%)	**<0.001***	**<0.001***	0.150*
Osteoarthritis	515 (19.7%)	202 (17.7%)	99 (15.2%)	203 (28.0%)	0.999*	**<0.001***	**<0.001***
Osteoporosis without fracture	247 (9.4%)	94 (8.2%)	41 (6.3%)	106 (14.6%)	0.999*	**<0.001***	**<0.001***
Osteoporosis with fracture	42 (1.6%)	11 (1.0%)	10 (1.5%)	20 (2.8%)	0.999*	0.129*	0.999*
Sciatic	204 (7.8%)	52 (4.5%)	58 (8.9%)	84 (11.6%)	**<0.001***	**<0.001***	0.999*
Scoliosis	152 (5.8%)	55 (4.8%)	46 (7.0%)	48 (6.6%)	0.999*	0.999*	0.999*
Spondylitis/ankylosing spondylitis	95 (3.6%)	24 (2.1%)	24 (3.7%)	44 (6.1%)	0.999*	**<0.001***	0.999*
Infection/spondylodiscitis	25 (1.0%)	1 (0.1%)	6 (0.9%)	18 (2.5%)	0.473‡	**<0.001‡**	0.999*
Tumour/metastasis	6 (0.2%)	1 (0.1%)	4 (0.6%)	1 (0.1%)	0.999‡	0.999‡	0.999*
Did not tell/made any diagnosis	474 (18.1%)	264 (23.1%)	105 (16.1%)	87 (12.0%)	**<0.001***	**<0.001***	0.999*
Other	303 (11.6%)	124 (10.8%)	86 (13.2%)	82 (11.3%)	0.999*	0.999*	0.999*
Does not know/no answer	584 (22.3%)	267 (23.4%)	145 (22.2%)	142 (19.6%)	0.999*	0.999*	0.999*
No of LBP-related diagnoses	1.19 (1.05)	0.97 (0.86)	1.22 (1.01)	1.54 (1.26)	**<0.001†**	**0.043†**	**<0.001†**
LBP-related medical diagnostic procedures (%)							
Clinical history/observation	1162 (44.4%)	487 (42.6%)	280 (42.9%)	359 (49.5%)	0.999*	0.129*	0.700*
Laboratory or imaging tests	2063 (91.1%)	852 (88.8%)	506 (89.1%)	651 (97.7%)	0.999*	**<0.001***	**<0.001***
Blood test	999 (38.2%)	382 (33.4%)	214 (32.8%)	382 (52.7%)	0.999*	**<0.001***	**<0.001***
Urinalysis	900 (34.4%)	340 (29.7%)	197 (30.2%)	344 (47.4%)	0.999*	**<0.001***	**<0.001***
X-ray	1668 (63.7%)	695 (60.8%)	408 (62.5%)	526 (72.6%)	0.999*	**<0.001***	**<0.001***
CT scan	849 (32.4%)	267 (23.4%)	233 (35.7%)	330 (45.5%)	**<0.001***	**<0.001***	**<0.001***
MRI	436 (16.7%)	97 (8.5%)	144 (22.1%)	187 (25.8%)	**<0.001***	**<0.001***	0.999*
Bone density test	286 (10.9%)	84 (7.3%)	75 (11.5%)	121 (16.7%)	0.129*	**<0.001***	0.300*
Bone scan	79 (3.0%)	13 (1.1%)	32 (4.9%)	33 (4.6%)	**<0.001***	**<0.001***	0.999*
Other	410 (15.7%)	27 (2.4%)	20 (3.1%)	15 (2.1%)	0.999*	0.999*	0.999*
Does not known/no answer	584 (22.3%)	199 (17.4%)	93 (14.2%)	82 (11.3%)	0.999*	**<0.001***	0.999*
No of laboratory or imaging tests	2.01 (1.72)	1.66 (1.51)	2.01 (1.81)	2.67 (1.76)	**<0.001†**	**<0.001†**	**0.05†**
Type of medical diagnostic procedures (%)							
Only clinical history/observation	190 (8.5%)	103 (10.9%)	58 (10.4%)	15 (2.3%)	0.999*	**<0.001***	**0.05***
Only laboratory or imaging tests	1074 (48.1%)	464 (48.9%)	281 (50.3%)	303 (45.8%)	0.999*	0.086*	0.100*
Both clinical history/observation and laboratory or imaging tests	967 (43.3%)	381 (40.2%)	220 (39.4%)	343 (51.9%)	0.999*	**<0.001***	**<0.001***
LBP-related medical treatment (%)	1940 (75.1%)	787 (69.8%)	511 (79.1%)	579 (81.3%)	**<0.001***	**<0.001***	0.999*

Continued

Table 3 Continued

	All (n=2618)	PCO (n=1143)	SCO (n=653)	MC (n=725)	PCO versus SCO p value	PCO versus MC p value	SCO versus MC p value
Route of administration (%)							
Oral medication/pills	1559 (80.4%)	624 (79.3%)	402 (78.7%)	485 (83.8%)	0.999*	0.999*	0.999*
Injectable	969 (49.9%)	332 (42.2%)	269 (52.6%)	349 (60.3%)	**<0.001***	**0.043***	0.550*
Does not known/no answer	99 (5.1%)	41 (5.2%)	30 (5.9%)	16 (2.8%)	0.999*	0.999*	0.550*
Type of medical treatment (%)							
Only oral medication/pills	872 (47.4%)	414 (55.5%)	212 (44.1%)	214 (38.0%)	**<0.001***	**0.043***	0.550
Only injectable	282 (15.3%)	122 (16.4%)	79 (16.4%)	78 (13.9%)	0.999*	0.999*	0.999*
Both oral medication/pills and injectable	687 (37.3%)	210 (28.2%)	190 (39.5%)	271 (48.1%)	**<0.001***	**<0.001***	0.250
Duration (days) of medical treatment	104.24 (266.80)	92.85 (245.84)	107.70 (330.05)	115.26 (229.71)	0.999†	**<0.001†**	**0.005†**
Seeking of additional healthcare providers	637 (24.5%)	194 (17.1%)	179 (27.6%)	226 (31.3%)	**<0.001***	**<0.001***	0.999*
Disciplines of providers sought							
Physiotherapists	426 (66.9%)	126 (64.9%)	126 (70.4%)	158 (69.9%)	0.999*	0.999*	0.999*
Psychologists	63 (9.9%)	23 (11.9%)	16 (8.9%)	23 (10.2%)	0.999*	0.999*	0.999*
Alternative medicine§	211 (33.2%)	54 (27.8%)	59 (33.1%)	76 (33.6%)	0.999*	0.999*	0.999*
Other	29 (4.6%)	8 (4.1%)	12 (6.7%)	6 (2.7%)	0.999*	0.999*	0.999*

Note: sample size is not constant due to missing data: All. Medical specialty sought for LBP: GP (n=2617); emergency department (n=2617); number of times LBP-related medical care was sought (n=2616); LBP-related diagnosis: other (n=2616); number of LBP-related diagnoses (n=2034); LBP-related medical diagnostic procedures: laboratory or imaging tests (n=2264); type of medical diagnostic procedures (n=2231); LBP-related medical treatment (n=2583); route of administration: oral medication/pills (n=1940); injectable (n=1940); does not know/no answer (n=1940); type of medical treatment (n=1841); duration (days) of medical treatment (n=1860); seeking of additional healthcare providers (n=2603). PCO. LBP-related diagnosis: number of LBP-related diagnoses (n=876); LBP-related medical diagnostic procedures: laboratory or imaging tests (n=960); type of medical diagnostic procedure (n=948); LBP-related medical treatment (n=1128); route of administration: oral medication/pills (n=787); injectable (n=787); does not know/no answer (n=787); type of medical treatment (n=746); duration (days) of medical treatment (n=757); seeking of additional healthcare providers (n=1135). SCO. LBP-related diagnosis: number of LBP-related diagnoses (n=508); LBP-related medical diagnostic procedures: laboratory or imaging tests (n=568); type of medical diagnostic procedures (n=559); LBP-related medical treatment (n=646); route of administration: oral medication/pills (n=511); injectable (n=511); does not know/no answer (n=511); type of medical treatment (n=481); duration (days) of medical treatment (n=498); seeking of additional healthcare providers (n=649). MC. Medical specialist sought for LBP: number of times seeking LBP-related medical care (n=724); LBP-related diagnosis: other (n=723); number of LBP-related diagnoses (n=583); LBP-related medical diagnostic procedures: laboratory or imaging tests (n=666); type of medical diagnostic procedures (n=661); LBP-related medical treatment (n=712); route of administration: oral medication/pills (n=579); injectable (n=579); does not know/no answer (n=579); type of medical treatment (n=563); duration (days) of medical treatment (n=547); seeking of additional healthcare providers (n=723).
*χ^2 test.
†Mann-Whitney test.
‡Fisher's exact test.
§Alternative medicine specialists included acupuncturists, homeopaths, osteopaths, naturopaths, herbalists, chiropractors, herbalists and healers.
GP, general practitioner; LBP, low back pain; MC, multiple care; PCO, primary care only; SCO, secondary care only.

Despite the recommendation that LBP should be managed at the primary care level,[9–11] a pattern of seeking care from multiple medical specialties is typically reported for LBP[12] and was also found in the present study. Among different medical specialties, care was most often sought from GPs at a frequency similar to that reported for other countries,[12] emphasising the central role that primary care plays in the development and implementation of strategies aiming to improve LBP care. However, more than half of individuals reported seeking secondary care for LBP. Consistent with previous findings,[22 23] emergency departments and orthopaedics were the mostly commonly sought secondary medical specialties. A potential explanation for the great proportion of individuals who seek emergency departments can be related to the fact that these are the only departments of secondary care in the public Portuguese health system that individuals can access without a referral. For all other specialties, a referral from a GP is always needed. For private health systems, individuals can access directly to any medical specialty. Thus, the found excessive seeking for secondary care may be explained by the existence of a great proportion of referrals from primary care (public health systems) or by the great proportion of patients who sought private system. Either way, these findings contrast with the current knowledge on the diagnosis, prognosis and specialist referral criteria for LBP and is even more concerning because secondary care was associated with higher rates of self-reported

pathoanatomical diagnoses, laboratory and imaging tests, and pharmacological treatments.

For nearly all patients, LBP has a non-specific cause, and its symptoms are poorly related to imaging findings, as degenerative and other structural changes are often observed in asymptomatic individuals.[24] Thus, the routine use of laboratory or imaging tests is not recommended and should only be considered when the presence of serious disease is suspected or the results of testing are likely to change treatment.[9–11] In the present study, many individuals reported that clinicians used pathoanatomical diagnoses to explain the presence of LBP that were supported by laboratory or imaging test findings, which may denote a scenario of generalised mismanagement of LBP. Aspects such as patients' expectations and beliefs that laboratory or imaging tests are essential for diagnosing back problems as well as clinicians' lack of time and confidence in ruling out serious diseases and explaining patients' symptoms are potential explanations for this suggestive overuse pattern of laboratory or imaging tests.[25 26] The high proportion of red flags reported by individuals in the present study may potentially lead clinicians to suspect the presence of serious disease and referral for laboratory or imaging tests. However, red flags are a frequent finding in LBP patients' history and their ability to detect the presence of serious disease is overall weak.[27 28] More importantly, the overuse of laboratory or imaging tests is harmful to both patients and healthcare systems, as they increase patients' disability and work absenteeism and trigger additional healthcare consumption, particularly surgeries, which increases the overall economic burden of LBP.[29 30]

Regarding management procedures, non-pharmacological therapy based on a biopsychosocial framework of patient education, exercise and self-management are recommended as first-line treatment for LBP.[9–11] In contrast, pharmacological treatment should only be considered if needed based on the lowest effective dose and for the shortest possible period.[9–11] In the present study, the high levels and long durations of pharmacological treatments associated with the low proportion of individuals who sought additional healthcare providers (ie, physiotherapists or psychologists) may be explained by several reasons: (1) poor adherence to guidelines recommendations by medical doctors; (2) lack of coordination and integration of care especially when, in Portugal, the vast majority of patients need a physician referral to use physiotherapy or psychology and; (3) the preference of individuals for passive interventions such as oral or injectable medication offered by medical doctors over treatments that require an active participation and effort in carrying out exercises and behaviour change, such as those provided by physiotherapists or psychologists.

The main strength of the present study is its detailed characterisation of medical diagnosis and management of LBP through a large and representative sample. This characterisation is based on data self-reported by individuals with a history of LBP, which is a novel approach in this type of research and may allow an indirect assessment of individuals' insights about the medical care they received, and, in other hand, a broader characterisation of care provided at a whole healthcare system and by specific levels (ie, primary, and secondary) using comparable data. Finally, our analysis employed a conservative approach, which increases the validity of the results.

Nonetheless, some limitations need to be considered. Despite the major strength and novelty associated with the use of patient-level self-reported data, this option has also important biases that needs to be recognised, such as accidental and memory bias. Driven by the challenges associated with the exclusion of specific causes of LBP and its explanation to patients, especially when they strongly expect to receive a specific diagnosis from clinicians,[26] terms such as 'osteoarthritis' or 'herniated disk' may be present on imaging reports and in the usual speech of clinicians. Despite the distinct goals to use these terms, their simple use may be sufficient for the patients to memorise and assimilate them as being part of the origin of their LBP symptoms. A similar misconception can happen regarding diagnostic procedures. For example, during an LBP-related appointment with the GP, this professional may need to prescribe a routine laboratory test. This simple procedure has the potential to trigger the misconception in the patient that this exam was prescribed to explore potential causes for LBP. The potential confounding associated with these examples of accidental bias can be further emphasised by the memory bias. The 12-month period used for LBP history and analysis of medical care-seeking leaves the results susceptible to this bias, particularly for questions which imply the patients to recall the duration of pain and disability, or the duration of medical treatment for LBP. Also, data collection was based on a previously designed questionnaire with limited response options which did not allow full analysis of patients' options or a complete characterisation of LBP management. An example of this limitation is related to the questions about the seeking pattern of additional healthcare providers. Despite most of the treatments provided by these professionals being recommended by the guidelines,[9–11] the lack of specificity on LBP by the question asked to individuals prevented a deeper analysis of this type of care. Lastly, the analysed data was collected in 2011–2013. Despite some differences may exist in LBP management, especially after the COVID-19 pandemic and the digitalization of healthcare, the absence of reforms associated with the management of RMD in Portugal (the last national plan for RMD dates 2004–2014[31]) made it improbable that this mismanaging scenario has changed substantially.

In conclusion, medical care seeking for LBP is frequent in Portugal and is associated with report of high levels of pathoanatomical diagnoses, imaging and laboratory tests and pharmacological therapy in both primary and secondary care settings. The use of self-reported data from a large population-based study reinforced

the argument that a widespread scenario of generalised mismanagement of LBP exists. This scenario was recently highlighted by the Lancet Low Back Pain Series Working Group where a group of LBP experts alerted for the existence of a substantial gap between evidence and clinical practice with harmful effects for patients.[5–7] These results represent an important alert to national and international governance for the urgent need to stimulate funding and delivery actions promoting high value care within local healthcare systems, as recently stated by the WHO.[8] Future studies should seek not only to investigate the costs and clinical implications of this suggestive scenario of mismanagement of LBP, namely exploring which specialties of secondary care are contributing more to this scenario or even characterise care provided by non-medical healthcare professionals, but also to develop and test models of care aiming to transfer scientific knowledge to real-world clinical practice contexts.

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Contributors Study design, study conduct, data interpretation: LAG, EBC, HC, AMR. Data collection: EpiReumaPt study group. Data analysis: LAG, EBC, ARH, HC, AMR. Drafting manuscript: LAG. Revising manuscript content, approving final version of manuscript: all authors. LAG is responsible for the overall content as guarantor.

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