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Matthieu Peurois, Aline Ramond-Roquin, Céline Bouton, Cyril Bègue, Natacha Fouquet, et al.. Influence of low back pain characteristics on the healthcare procedures prescribed by general practitioners for adult patients: ancillary analysis of the French ECOGEN study. *Epidemiology and Public Health = Revue d'Epidémiologie et de Santé Publique*, 2022, 70 (3), pp.133-139. 10.1016/j.respe.2022.03.001 . hal-03705571

**HAL Id: hal-03705571**

**<https://hal.science/hal-03705571>**

Submitted on 23 Jan 2023

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Original article

## Influence of low back pain characteristics on the healthcare procedures prescribed by general practitioners for adult patients: ancillary analysis of the French ECOGEN study



*L'impact des caractéristiques des douleurs lombaires sur les soins prodigués ou prescrits aux patients adultes par les médecins généralistes : Une analyse secondaire de l'étude française ECOGEN*

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### ARTICLE INFO

#### Article History:

Received 14 September 2021

Accepted 8 March 2022

Available online 8 April 2022

#### Keywords:

low back pain  
 general practice  
 healthcare procedures

### ABSTRACT

**Background.** – Non-specific low back pain is a frequent reason for consultation, yet little is known about how general practitioners manage it in France.

**Objectives.** – To describe the healthcare procedures general practitioners prescribe for low back pain in France.

**Materials and methods.** – This is an ancillary analysis of an observational, cross-sectional study (ECOGEN) conducted between November 2011 and April 2012 among 128 general practitioners. Adults younger than 65 years consulting for low back pain were included. Patient and general practitioner characteristics, consultation results (diagnosis) and healthcare procedures were collected and coded using the International Classification in Primary Care. Analyses focused on the initial or follow-up consultation, adjusting on age, gender, and socio-occupational category.

**Results and discussion.** – Out of 11510 consultations, 845 (7.3%) were for low back pain. Of these, 776 (79.5%) resulted in a clinical examination, 634 (73.4%) in medication prescription, and 203 (23.9%) were prescribed sick leave, but imaging and specialist referral were rare. Imaging was more frequent with radiating pain (adjusted odds ratio (aOR) = 1.61; 95% CI [1.07, 2.42]), as were specialist referrals (OR = 2.92; 95% CI [1.40, 6.09]) and sick leave prescription (aOR = 1.52; 95% CI [1.10, 2.09]), but physiotherapist referral was less frequent (aOR = 0.55; 95% CI [0.38, 0.82]). Clinical examinations (aOR = 2.75; 95% CI [1.98, 3.80]), imaging (aOR = 1.61; 95% CI [1.02, 2.31]) and medication prescriptions (aOR = 2.34; 95% CI [1.65, 3.30]) were more common in initial consultations, but specialist referral (aOR = 0.16; 95% CI [0.05, 0.47]) or sick leave prescription (aOR = 0.68; 95% CI [0.48, 0.97]) were rarer.

**Conclusion.** – Low back pain characteristics could influence healthcare procedures more markedly than patient or general practitioner characteristics.

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**Disclosure statement :** The authors declare that they have no competing interest.

**Funding :** The authors received no financial support for the research, authorship, and publication of this article.

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<https://doi.org/10.1016/j.respe.2022.03.001>

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## R É S U M É

## Mots clés:

douleurs lombaires  
généralistes  
soins de santé

**Contexte.** – Les douleurs lombaires non spécifiques sont un motif fréquent de consultation, mais on en sait peu sur la manière dont les médecins généralistes gèrent ces plaintes.

**Objectif.** – Décrire les soins prodigués ou prescrits par les médecins généralistes en France pour les douleurs lombaires.

**Matériel et méthodes.** – Il s'agit d'une analyse secondaire de l'étude ECOGEN, une étude observationnelle et transversale menée entre novembre 2011 et avril 2012 auprès de 128 médecins généralistes. Étaient inclus les adultes de moins de 65 ans qui consultaient pour des douleurs lombaires. Les caractéristiques des patients et des praticiens, le résultat de la consultation (diagnostics) et les soins prodigués ou prescrits étaient collectés et codés selon la classification internationale en soins primaires. Les analyses ont distingué les consultations initiales ou de suivi, en ajustant pour l'âge, le sexe et la catégorie socio-professionnelle.

**Résultats et discussion.** – Sur 11510 consultations, 845 (7,3 %) étaient motivées par des douleurs lombaires. Parmi celles-ci, 776 (79,5 %) ont conduit à un examen clinique, 634 (73,4 %) à une ordonnance de médicament et 203 (23,9 %) à un arrêt de travail. La prescription d'imagerie et le renvoi vers un spécialiste étaient peu fréquents. La prescription d'imagerie était plus fréquente en cas de douleurs irradiantes (Odds ratio (OR) ajusté = 1,61 ; IC95 % [1,07-2,42]), de même que l'adressage à un spécialiste (OR ajusté = 2,92 ; IC95 % [1,40-6,09]) et l'arrêt de travail (OR ajusté = 1,52 ; IC95 % [1,10-2,09]). En revanche, la prescription de kinésithérapie était moins fréquente (OR ajusté = 0,55 ; IC95 % [0,38-0,82]). L'examen clinique (OR ajusté = 2,75 ; IC95 % [1,98-3,80]), l'imagerie (OR ajusté = 1,61 ; IC95 % [1,02-2,31]) et la prescription de médicaments (OR ajusté = 2,34 ; IC95 % [1,65-3,30]) étaient plus fréquents en consultation initiale, mais l'adressage chez un spécialiste (OR ajusté = 0,16 ; IC95 % [0,05-0,47]) et l'arrêt de travail (OR ajusté = 0,68 ; IC95 % [0,48-0,97]) étaient moins fréquents.

**Conclusion.** – Les caractéristiques des douleurs lombaires pourraient influencer les soins prodigués ou prescrits plus fortement que les caractéristiques des patients ou celles des praticiens.

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## 1. Introduction

Non-specific low back pain (LBP) is a musculoskeletal condition of multifactorial origin. It is defined as pain between the ribcage and the lower inter-gluteal fold, which can be associated with radiating pain, particularly of crural or sciatic nerve origin, without signs of trauma, inflammation, infection, neoplasia, metabolic or congenital disease [1]. LBP has the sixth highest global burden and causes more disability worldwide than any other condition [2].

Although non-specific LBP lasting less than four weeks has a good prognosis, the probability of a favourable outcome decreases markedly after this time lapse [3]. After 12 weeks, subacute LBP becomes chronic and is commonly associated with physical deconditioning syndrome, which must be managed with physical exercise [1]. It is also associated with psychosocial difficulties, prolonged absenteeism [4, 5] reduced quality of life and major costs for society [6]. In recent decades, a biopsychosocial model of LBP has emerged, highlighting the importance of psychosocial (psychological, psychiatric, occupational, social...) risk factors in the transition to chronicity [7].

Up until recently, patient pathway guidelines were unclear, and meaning referrals to specialists were often late or non-existent. Late referral to occupational health services is commonly a barrier to job retention, which is a major problem insofar as LBP has become the leading cause of absenteeism before the age of 45 in France [1]. That is one reason improved coordination between clinical services and occupational health professionals is called for [8, 9].

Published in the early 2000s, previous guidelines recommend multidimensional management: prescribing pain relief (both pharmacological and non-pharmacological), promoting physical exercise, identifying psychosocial factors and preventing occupational disability [10–12]. However, a lack of clear, practical recommendations resulted in heterogeneous LBP management and treatment strategies, with General Practitioners (GPs) often adhering to traditional schemas based on biomechanical analysis, imaging, non-pharmacological therapies and pharmacological analgesia, even though medications are often being ineffective or even harmful [1, 13, 14]. Heterogeneous and

poorly evidence-based medical practices result in GPs feeling frustrated and experiencing difficulty caring for patients with LBP, especially those with subacute and chronic LBP [15].

GPs are well-placed to influence patient prognosis, adherence, and outcome. In France, 77 % of adults aged 30 to 69 with LBP consult a GP compared to just 9 % consulting a rheumatologist and 3 % a surgeon [16]. Moreover, healthcare reimbursement data research suggest that LBP management among GPs in France is suboptimal [17].

To improve recommendations for LBP treatment and patient care pathways, this study aimed to describe the healthcare procedures French GPs prescribe for patients aged 18 to 65 years consulting for LBP, with or without radiating pain.

## 2. Methods

### 2.1. Study design

This study is an ancillary study to ECOGEN (Elements of Consultation in General practice), which is a French observational, cross-sectional, multicentre, national study conducted by the French National College of General practitioner Teachers (*Collège National des Généralistes Enseignants*) between November 2011 and April 2012. The ECOGEN study design has previously been described [18]. One hundred and twenty-eight GPs (internship supervisors) affiliated with 27 French medical schools participated and 54 trainee GPs collected the data. The trainees had undergone a 2-day data collection training course.

### 2.2. Inclusion criteria

Adult patients younger than 65 years were included in this ancillary study if a health problem managed during the consultation (hereafter called a consultation result) was coded L03 (low back symptom), L84 (low back syndrome without radiating pain) or L86 (low back syndrome with radiating pain), either as a single consultation result or as one of several.

### 2.3. ECOGEN Data collection

During the ECOGEN study, trainee GPs collected demographic and health data from each patient who consulted the GP one day a week. Age, gender, socio-professional category, workers' compensation and other benefits, initial or follow-up consultation, reason(s) for consultation, consultation result(s) and healthcare procedures were specified. A healthcare procedure was defined as a clinical examination, imaging or laboratory investigation, medication prescription, referral to other physicians or allied health professionals, certificate provision, sick leave prescription, advice, or recommendations.

Healthcare procedures were coded using ICPC-2 codes (International Classification in Primary Care, 2<sup>nd</sup> edition) [19]. This classification was initially proposed by the WONCA (World Organization of Family Doctors) and developed by leading primary care experts worldwide. In 1987, the WHO recognized the ICPC as the reference classification for classification of patient data and clinical activity in primary care. It bears mentioning that reasons for consultation, consultation results, and healthcare procedures can be classified by body system according to a hierarchical structure. The ICPC-2 data codes were supplemented with verbatims from patient records. The data were then anonymized and filed in a centralized online database. Double data collection was performed in one day to evaluate reproducibility and the error rate for each investigator.

### 2.4. Analyses

The characteristics of patients consulting for LBP were initially compared with those consulting for other reasons. As regards patients who consulted for LBP, patient and GP characteristics and healthcare procedures were subsequently described and compared according to gender, age, presence of radiating pain, LBP persistence (initial or follow-up consultation), practice location and type. A multivariate marginal model was drawn up, adjusted on age, gender, socio-occupational category, and variables associated with physiotherapy prescription in univariate analyses.

### 2.5. Statistics

Quantitative variables were described by means and standard deviation (or medians and quartiles according to distribution) and compared using Student's t-test, or a non-parametric Mann Whitney Wilcoxon test if needed. Qualitative variables were described by percentages and compared using the Chi-square test (or a Fisher test if  $n < 5$ ). When relevant, a Bonferroni correction for multiple statistical comparisons was applied.

Probability of each healthcare procedure was modelled according to LBP characteristics (radiating pain and persistence) using a logistic marginal adjusted model based on Generalised Estimating Equations (GEE) with an exchangeable variance-covariance matrix, given the hierarchical data structure and the population-average approach. The marginal univariate analyses were first performed for each healthcare procedure, and only those associated with a statistical p-value  $< 0.20$  were retained. A multilevel analysis adjusted on age and gender was then performed with the variables retained, and a statistical  $\alpha$  threshold of 0.05 was used for the final model. Statistical analyses were performed on R software, version 1.1.463.

### 2.6. Ethical considerations

An ethics committee approved the ECOGEN study (CPP Sud-Est IV, registration number: L11-149, approval date: 10/11/2011) and included consent for ancillary studies on the ECOGEN database. A poster in the waiting room informed patients about the study and the GP collected verbal consent at the beginning of the consultation.

## 3. Results

### 3.1. Study population

Participating GPs were 53 years old on average and one third were women (33.6 %). More than half were in group practice (61.7 %) within an urban area (51.6 %). The median number of consultations per day was 20 and the median number of consultations annually was 5000 [Q1=3991; Q3=6125].

The number of ECOGEN consultations performed for patients aged 18 to 65 years was 11510 (Figure 1). While 60 % of the patients were women, their mean age was 44.1 (SD=13.26) and 93.78 % were previously known to the GP. On average, each consultation generated 2.1 consultation results and 4.6 associated healthcare procedures, with median consultation duration of 15 minutes [Q1=10; Q3=20] and a mean number of 2.21 procedures (SD=1.12) per consultation result.

LBP was a consultation result for 845 (7.3 %) patients. Compared with consultations for other health problems, patients consulting for LBP were less frequently female (55.6 % vs 60.5 %,  $p=0.006$ ), aged 45 to 54 (26.1 % vs 21.4 %,  $p<0.001$ ), manual workers (10.5 % vs 6.6 %,  $p<0.001$ ) and receivers of benefits (9.6 % vs 4.1 %,  $p<0.001$ ). The mean number of healthcare procedures was higher in consultations for LBP than in those for any other reason: 2.92 vs 2.19,  $p<0.001$ . (Table 1)

Among the 845 LBP consultations, 324 (38 %) patients presented radiating pain. There was no statistical difference between the presence or absence of radiating pain, in terms of age, gender, profession, workers' compensation and other benefits, practice location or consultation duration (Table 2). The mean number of healthcare procedures was slightly higher in consultations with radiating pain than in those without (3.06 vs 2.84;  $p=0.02$ ).

### 3.2. Healthcare procedures for LBP according to patient characteristics

Among the patients who presented for LBP, 776 (79.5 %) underwent a clinical examination and 634 (73.4 %) were prescribed medication. Sick leave was prescribed for 203 (23.9 %), 220 (22.8 %) received advice and 190 (22.1 %) were referred to physiotherapists, while only 113 (12.9 %) were referred for imaging and 45 (5.2 %) to medical specialists (Table 3). Radiography was more frequent with 69 (8.1 %) patients being x-rayed compared with only 23 (2.7 %) having a CT and 18 (2.1 %) having an MRI scan ( $p<0.001$ ). No significant difference for healthcare procedures was found according to patient age or gender.

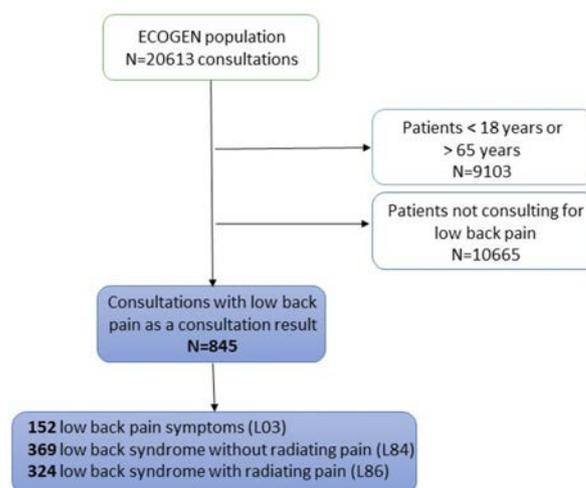


Fig. 1. Flow diagram of patient inclusion process

**Table 1**  
Patient characteristics in consultations with or without LBP (N=11510 consultations)

	Consultation for low back pain* N=845	Consultations for any other reason N=10665	p-value
Female gender, n (%)	470 (55.6)	6453 (60.5)	0.006
Age, n (%)			< 0.001 ~
18-34 years old	168 (19.9)	3022 (28.4)	
35-44 years old	197 (23.3)	2167 (20.4)	
45-54 years old	221 (26.1)	2286 (21.4)	
55-65 years old	259 (30.7)	3190 (29.9)	
Socio-occupational category, n (%)			<0.001 ~
Farmer, self-employed, retail trades, business person	43 (5.1)	578 (5.4)	
Managerial and Intermediate professions	125 (14.8)	2096 (19.7)	
Salaried employee	362 (42.8)	3554 (33.3)	
Manual worker	89 (10.5)	703 (6.6)	
Retired	99 (11.8)	1401 (13.1)	
Unemployed	127 (15)	1333 (12.9)	
Workers' compensation and other benefits, n (%)	81 (9.6)	432 (4.1)	<0.001
Consultation duration in minutes: mean (SD)	18.11 (15.20)	17.15 (16.35)	0.08
Practice location, n (%)			0.11 ~
Rural	167 (19.8)	1876 (17.6)	
Semi-rural	221 (26.2)	2638 (24.7)	
Urban	457 (54.1)	6151 (57.7)	
Number of procedures by consultation result: mean (SD)	2.92 (1.39)	2.19 (1.28)	<0.001

LBP: low back pain, \* either as single consultation result or as one of multiple consultation results, ~ global p-value (Fisher's Exact Test)

**Table 2**  
Patient characteristics in LBP consultations with or without radiating pain (N=845)

	Low back pain without radiating pain N=521	Low back pain with radiating pain N=324	p-value
Female gender, n (%)	293 (56.2)	177 (54.6)	0.7
Age, n (%)			0.22 ~
18-34 years old	110 (21.1)	58 (17.9)	
35-44 years old	128 (24.6)	69 (21.3)	
45-54 years old	125 (24)	96 (29.6)	
55-65 years old	158 (30.3)	101 (31.2)	
Socio-occupational category, n (%)			0.42 ~
Farmer, self-employed, retail trades, business person	26 (5.0)	17 (5.2)	
Managerial and intermediate professions	71 (13.6)	54 (16.7)	
Salaried employee	220 (42.2)	142 (43.8)	
Manual worker	50 (9.6)	39 (12)	
Retired	68 (13.1)	31 (9.6)	
Unemployed	86 (6.5)	41 (12.7)	
Workers' compensation and other benefits, n (%)	45 (8.6)	36 (14.2)	0.53
Consultation duration in minutes: mean (SD)	17.41 (8.5)	19.5 (21.9)	0.08
Practice location, n (%)			0.33 ~
Rural	111 (21.3)	56 (17.3)	
Semi-rural	136 (26.1)	85 (26.2)	
Urban	274 (52.6)	183 (56.5)	
Number of healthcare procedures per consultation result: mean (SD)	2.84 (1.36)	3.06 (1.44)	0.02

LBP: low back pain, ~ global p-value (Fisher's Exact Test)

**Table 3**  
Healthcare procedures associated with LBP consultations, overall, and according to radiating pain status

	LBP consultations overall N=845	LBP without radiating pain N=521	LBP with radiating pain N=324	Univariate model (with / without radiating pain) OR (CI 95 %)	Multivariate model* (with / without radiating pain) Adjusted OR (CI 95 %)
Clinical examination, n (%)	776 (79.5)	410 (78.7)	262 (80.9)	0.85 (0.64-1.14)	
Imaging, n (%)	113 (12.9)	55 (10.6)	54 (16.7)	1.61 (1.08-2.39)	1.61 (1.07-2.42)
Radiography	69 (8.1)	45 (8.6)	23 (7.1)		
CT scan	23 (2.7)	6 (1.2)	17 (5.2)		
MRI scan	18 (2.1)	4(0.8)	14 (4.3)		
Referral to a specialist, n (%)	45 (5.2)	16 (3.1)	28 (8.6)	3.51 (1.68-7.3)	2.92 (1.40-6.09)
Medication, n (%)	634 (73.4)	371 (71.2)	249 (76.9)	1.25 (0.92-1.7)	
Equipment and devices, n (%)	30 (3.6)	19 (3.6)	11 (3.4)	1.46 (0.62-3.47)	
Physiotherapy, n (%)	190 (22.1)	133 (25.5)	54 (16.7)	0.49 (0.33-0.72)	0.55 (0.38-0.82)
Recommendations, education, advice, n (%)	220 (22.8)	118 (22.6)	75 (23.1)	1.11 (0.79-1.56)	
Sick leave, n (%)	203 (23.9)	106 (20.3)	96 (29.6)	1.57 (1.14-2.15)	1.52 (1.10-2.09)

LBP: low back pain, \* marginal logistical analysis adjusted on gender and age

When LBP was associated with radiating pain, imaging investigations were more frequently prescribed (Adjusted OR (aOR) =1.61; 95 % CI [1.07-2.42]), especially CT and MRI scans, as were specialist referrals (aOR=2.92; 95 % CI [1.40-6.09]) and sick leave (aOR=1.52; 95 % CI [1.10-2.09]), while physiotherapist referral was less frequent (aOR=0.55; 95 % CI [0.38- 0.82]).

Patients were prescribed an average of 3.57 healthcare procedures in an initial LBP consultation and 2.38 procedures in follow-up consultations, with mean consultation durations of 17.4 minutes and 19.99 minutes, respectively. After marginal logistical analysis adjusted on gender and age, clinical examinations (aOR=2.75; 95 % CI [1.98, 3.80]), imaging investigations (aOR=1.61; 95 % CI [1.02, 2.31]) and medication prescriptions (aOR=2.34; 95 % [1.65, 3.30]) were more common in an initial LBP consultation. However, referral to a specialist (aOR=0.16; 95 % CI [0.05, 0.47]) or prescription of sick leave (aOR=0.68; 95 % CI [0.48, 0.97]) were less common. (Table 4)

### 3.3. Healthcare procedure according to physician characteristics

No significant association was found between healthcare procedures and GP age, gender, or practice type. There were 3.02 healthcare procedures prescribed per consultation result in rural and semi-rural areas and 2.84 in urban areas (p=0.048). Physiotherapy prescription was considerably more frequent in rural (26.9 %) and urban areas (24.7 %) than in semi-rural areas (13.1 %) (p<0.001) and referral to complementary therapies was decidedly more common in rural areas (12.6 %) compared with urban (2.8 %) and semi-rural areas (6.8 %) (p<0.001).

## 4. Discussion

### 4.1. Main findings

Our study found that on average, GPs delivered more healthcare procedures during LBP consultations than during consultations for other health problems. Around three quarters of LBP patients underwent clinical examinations and were prescribed medication, around one quarter were prescribed sick leave, but imaging and specialist referrals were rare. LBP clinical characteristics, including radiating pain or persistence, influenced the number and types of healthcare procedures more than patient or GP sociodemographic characteristics.

### 4.2. Results in relation to the existing literature

#### 4.2.1. Patient and LBP characteristics

In this study, LBP accounted for 7.3 % of consultations for adults aged between 18 and 65. These results concur with the Observatory

of General Medicine results, where LBP was the eighth most common reason for consultation in 2009 and accounted for 6.88 % of consultations [20]. More specifically, LBP consultations more frequently involved patients aged 45 to 54, women, manual workers, and salaried employees. These results are similar to ours and those reported in an epidemiological LBP study which found that LBP prevalence was 5.14 %, slightly higher among women than men (5.3 % vs 4.99 %) and more frequent in the 50 to 54 age group using the ICP-2-classification (codes L03, L84 and L86) [21]. Furthermore, the French CONSTANCE study identified workers and employees in certain industries as being more susceptible to developing LBP symptoms during their professional lives [22].

#### 4.2.2. Healthcare procedures

We observed that more healthcare procedures were prescribed in LBP consultations than in other consultations. This is consistent with the biopsychosocial LBP model and the multidimensional therapeutic approach. GPs proposed a variety of healthcare procedures depending on the clinical situation. We found that more patients underwent a clinical examination during the initial consultation (n=363, 94.5 %) than in the follow-up consultations (n=309, 67 %) and were prescribed more medications (n=324, 84.4 % vs n=294, 64.2 %) (aOR=2.34; 95 % CI [1.65, 3.30]). These results are similar to those from a Dutch study, in which 85 % of patients underwent a clinical examination during the initial consultation compared with 65 % in follow-up consultations and were prescribed more medication in the initial consultation than in the follow-up consultations (53 % vs 41 %) [23].

In agreement with our study, E. Volin found no link between LBP management and patient gender, but urban GPs prescribed less medication than rural GPs [24]. Other studies in Spain, Sweden and the UK reported similar results for clinical examination, medication, referral to a specialist or physiotherapist and sick leave prescription [25, 26].

Sick leave prescription rates vary according to LBP diagnosis and persistence. In a Swedish cohort of 20251 patients, the sick leave prescription rate was higher (around 31 %) for persistent LBP [27]. It has been suggested that regular medication use could be a prognostic factor associated with long-term sick leave [28]. We found that two thirds of patients with persistent LBP received medication, suggesting a possible marker, and indicating that specific intervention such as active physiotherapy is called for.

European guidelines recommend imaging only for specific LBP cases with clinical red flags or persistent pain. In our study, radiography prescriptions are high compared to these recommendations. However, CT and MRI scans and referrals to specialists were more

**Table 4**  
Healthcare procedures associated with LBP consultations according to follow-up status

	Initial LBP consultation N=384	Follow-up LBP consultation N=461	Univariate model (first/follow-up LBP consultation) OR (CI 95 %)	Multivariate model* (first/follow-up LBP consultation) Adj OR (CI 95 %)
Procedures	N=1372	N=1099		
Clinical examination, n (%)	363 (94.5)	309 (67.0)	3.22 (2.36-4.38)	2.75 (1.98-3.80)
Imaging, n (%)	60 (15.6)	49 (10.6)	1.54 (1.02-2.31)	0.16 (0.05-0.47)
Radiography	43 (11.2)	26 (5.4)	0.15 (0.05-0.43)	
CT scan	13 (3.4)	10 (2.2)		
MRI scan	4 (1.0)	14 (3.0)		
Referral to a specialist, n (%)	7 (1.8)	37 (8.0)		
Medication, n (%)	324 (84.4)	296 (64.2)	2.69 (1.94-3.71)	2.34 (1.65-3.30)
Equipment and devices, n (%)	9 (2.3)	21 (4.6)	0.89 (0.37-2.12)	
Physiotherapy, n (%)	80 (20.8)	107 (23.2)		
Recommendations, education, advice, n (%)	93 (24.2)	100 (21.7)	0.93 (0.67-1.35)	
Sick leave, n (%)	94 (24.5)	108 (23.4)	0.74 (0.54-1.01)	0.68 (0.48-0.97)

LBP: Low back pain. \* marginal logistical analysis adjusted on gender and age

frequent with radiating pain, which is consistent with recommendations.

New guidelines on LBP management have recently been published, providing clear patient pathways and management recommendations [29]. Our study data are likely to be useful in discussion of changes in French GP clinical practice in light of these new guidelines. While GPs are well-placed to provide early LBP diagnosis and management, they need time and experience to integrate recommendations in their practice.

#### 4.3. Strengths and limitations

To our knowledge, the 2011–2012 ECOGEN study is the first and only large-scale French study providing a detailed description of general practice consultations and exploring healthcare procedures according to clinical and sociodemographic patient characteristics. Similarly, as there are relatively few data available and since many are dated, it was difficult to find relevant comparative studies from other countries.

The ICPC-2 classification and observational design added value compared with previous studies using questionnaires, which can entail memory and declaration biases, or with studies using medico-socio-economic data restricted to reimbursed procedures [17, 30].

The ECOGEN study describes reasons for consultation and healthcare procedures associated with the main health problems confronted in French general practice, thereby creating a degree of observer bias. A Hawthorne effect is also possible, either from the GP or the patient. However, French GP internship supervisors are used to being observed by a student in their practice, which should limit this effect. Another limitation is that LBP episode duration was not recorded (consultations could only be classified as initial or follow-up), and the ICPC-2 classification did not enable pain assessment.

As the ECOGEN study was conducted at a consultation level, it is possible that a given patient consulted several times during the study period. This risk is limited and would have had little impact on the study results. The double data collection assessing reproducibility covered around 5 % of all consultations and found a difference of 3.5 %, which was considered satisfactory. The low refusal rate (1 %) implies a low level of non-participation bias. Physician representativeness in the ECOGEN study was assessed according to sociodemographic variables (age, gender, practice location). The ECOGEN GP characteristics were not statistically different from those of French GPs generally [18, 31] meaning that the results can be generalised to GPs throughout France.

#### 5. Conclusion

The healthcare procedures prescribed for LBP were not always in line with existing French guidelines. LBP characteristics, including radiating or persistent pain, influenced healthcare procedures more markedly than patient or GP characteristics.

#### Disclosure statement

The authors declare that they have no competing interest.

#### Funding

The authors received no financial support for the research, authorship, and publication of this article.

#### Acknowledgments

The authors would like to thank all the patients, interns, GP tutors and ECOGEN researchers who contributed to this study.

Editorial assistance in the preparation of this article was provided by Speak the Speech Consulting.

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