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The incidence and management of shoulder complaints in general practice: a retrospective cohort study

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Abstract

Background: Shoulder pain is the third most common musculoskeletal complaint in primary care. The international guidelines for general practitioners (GPs) recommend a stepwise treatment of shoulder pain. Little is known about the actual distribution of these treatments in current practice.
Objective: To gain insight in the incidence and current management of shoulder complaints in Dutch general practice.
Methods: A retrospective cohort study was conducted using a health care database containing the full electronic medical records of approximately 200 000 patients in Dutch general practice. A search algorithm was constructed to identify incident cases of shoulder complaints from January 2012 to December 2017. Data on the management of shoulder complaints were manually validated in a random sample of 1000 cases.
Results: The overall incidence of shoulder complaints was 30.3 (95% confidence interval 29.9–30.7) per 1000 person-years. More than half of the patients (58.6%) consulted their GP only once, 44.4% two times or more and 19.7% three times or more. For most patients (58.1%), the GP applied a wait-and-see policy or prescription of oral medication in the first consultation. However, no less than 42.9% of the patients were referred or received an injection already in the first consultation.
Conclusions: There is a wide variety of treatments for shoulder complaints applied by the GP. Some patients are referred or received an injection already in the first consultation. The stepwise approach recommended by the guideline, might not always be applicable due to the diversity of patient- and shoulder characteristics presented in general practice.

Key words: Corticosteroid injection, general practice, incidence, physiotherapy, primary care, shoulder pain

Introduction

Shoulder complaints are the third most common musculoskeletal disorder in primary care. Reported incidence rates of shoulder complaints in the Netherlands and the UK vary and range from 19.0 to 45.3 per 1000 person-years (1–6).

The prognosis for shoulder complaints is unfavourable. Only 50% of all new episodes of shoulder complaints end in complete recovery within 6 months (7). In general, apart from pain, patients with shoulder complaints report having functional disabilities which

Key Messages

- Shoulder complaints are common and the management is not straightforward.
- 43% of the patients were referred or received an injection already in the first consultation.
- A wait-and-see policy or referral to a physiotherapist results in the least follow-up consultations.

can reach a level of severity whereby they preclude work-related tasks, resulting in sick leave and indirect costs (8).

The management of shoulder complaints in primary care is focussed on controlling pain and restoring or maintaining the function of the shoulder joint. The Dutch Guideline for Shoulder Complaints, issued by the Dutch College of General Practitioners, advises a stepwise approach in the management of shoulder complaints. At first, the general practitioner (GP) is recommended to provide information, give advice and, if necessary, prescribe analgesics. If pain persists, the GP is advised to prolong the analgesics, administer a local corticosteroid injection or refer the patient to a physiotherapist. Finally, a patient can be referred to secondary care (9).

Currently, there is insufficient evidence on the best treatment for shoulder complaints in primary care, and information on the actual management by the GP is limited. In order to improve treatment and guide future research, it could be valuable to explore the course and management of shoulder complaints in general practice.

The objective of this study was to determine the incidence, describe the applied management policy and establish the consultation rates for patients with a new episode of shoulder complaints in general practice using an extensive retrospective cohort.

Methods

Design

A retrospective cohort study was performed using the Rijnmond Primary Care database (RPCD), which is a region-specific derivative of the Integrated Primary Care Information (IPCI) database, focussed on the greater Rotterdam area. The database contains pseudonymized longitudinal medical data, such as symptoms, diagnoses, referrals, laboratory findings, discharge letters and drug prescriptions of patients in Dutch general practice (10,11). The RPCD consists of the medical data of approximately 200 000 primary care patients.

Study population

A search algorithm was constructed to identify adult patients (≥18 years old) with a new episode of shoulder complaints between 1 January 2012 and 31 December 2017. Diagnoses of shoulder complaints were identified using the International Classification for Primary Care (ICPC) coding (12). In this study, patients who received the ICPC code L08.00 (Shoulder symptoms/complaints) or L92.00 (Shoulder syndrome/periarthitis humeroscapularis) were included.

The shoulder complaint was considered new if the patient had not been diagnosed by the GP with shoulder complaints in the preceding 12 months. Consequently, a patient could be included more than once during the 5-year period. Patients with at least 12 months of valid database available at the study entry were included in the cohort.

Management and consultation rates

We selected a random sample of 1000 incident cases from the study population, identified through our search algorithm. The full medical files were examined from the consultation date of the initial diagnosis until 12 months after the diagnosis. The following definition for shoulder complaints was used to identify cases: 'Shoulder complaints include all pain that is located in all or part of the area that runs from the base of the neck to the elbow and is not a consequence of serious recent trauma' (9). Cases where the shoulder diagnosis did not match our definition were excluded from further analyses.

For each patient in the random sample, information on the side of the affected shoulder (left, right, both, unknown) and duration of complaints at the first consultation was extracted. The duration was categorized as acute (<6 weeks), non-acute (>6 weeks) or unknown. The patient's age at the first consultation, gender and history of shoulder complaints (an episode of shoulder complaints ≥12 months before the current episode) were also extracted from the electronic medical files. Information on the management by the GP at each consultation for the shoulder complaints within 12 months following the initial diagnosis was extracted. The applied management approach was categorized as: a wait-and-see policy (if no active treatment was given), prescription of oral medication (divided into paracetamol, nonsteriodal anti-inflammatory drugs (NSAID) or opioids), administration of a corticosteroid injection, referral to a physiotherapist, commissioning of additional diagnostic imaging (including X-ray, ultrasound or magnetic resonance imaging) and/or referral to secondary care (including orthopaedic surgeon, neurologist or rheumatologist).

Statistical methods

The incidence rate was determined by dividing the number of found cases by the total number of person-years and expressed per 1000 person-years for each year and grouped by age and gender. Furthermore, 95% confidence intervals (CIs) for the incidence rates were constructed based on a Poisson distribution. Uncommon events, such as specific diseases are often modelled using Poisson distribution (13). Descriptive statistics were used to describe the management policy applied to patients with shoulder complaints. Frequencies of consultations, management by GPs, patient and shoulder characteristic were described using the mean with the standard deviation for normally distributed data and median with the interquartile range for non-normally distributed data. Statistical analysis was performed using a Pearson chi-square test for comparing proportions. A multivariate logistic regression was performed to determine the likelihood of a follow-up consultation, using the management at the first consultation as a predicting variable. A P value less than 0.05 was considered statistically significant. All analyses were performed using SPSS (version 25).

Results

The search algorithm identified 18 678 patients (≥18 years old) with a new episode of shoulder complaints. In total, 56.4% were women and the mean age was 54.0 (SD 16.3). The mean incidence over the study period was 30.3 (95% CI 29.9–30.7) per 1000 person-years. Women had a higher incidence rate of 32.8 (95% CI 32.1–33.4) compared with men, at 27.6 (95% CI 27.0–28.2). There was a peak

incidence at the age of 50–59 for both women, at 42.9 (95% CI 41.2–44.7), and men, at 36.5 (95% CI 34.9–38.2) (Fig. 1).

Sample characteristics

In the random sample of 1000 incident cases, 84 patients had to be excluded because the description of their diagnosis in free text did not match the criteria for shoulder complaints for this study, as defined by the Dutch College of General Practitioners (9).

In this sample of 916 patients, 58.4% (n = 535) were women and the mean age was 53.8 (SD 15.5). There were 350 patients (38.2%) with reported acute complaints (<6 weeks), and 209 patients (22.8%) with reported non-acute complaints (≥6 weeks). In 257 patients (39.0%) the duration of the complaints was unknown. Overall, 31.1% (n = 285) of the patients had a prior history of shoulder complaints (Table 1). Only 4.8% (n = 44) of the patients had bilateral complaints at the first consultation.

Consultation rates

The average number of consultations during the 12 months follow-up was 1.8 (SD 1.2). More than half of the patients, 58.6% (n = 537), consulted their GP only once, 44.1% visited the GP twice or more and 19.7% three times or more. The number of consecutive consultations almost halved (44.6%, SD 3.1%) with each following consultation (Fig. 2). The median duration between the first and second consultation was 38 days (interquartile range 96).

Management

First consultation

The GPs adopted a wait-and-see policy in the first consultation for 15.6% (n = 143) of the patients. Oral medication was prescribed for 50.3% (n = 461) of the patients in the first consultation; in most cases this was an NSAID (66.4%), followed by paracetamol

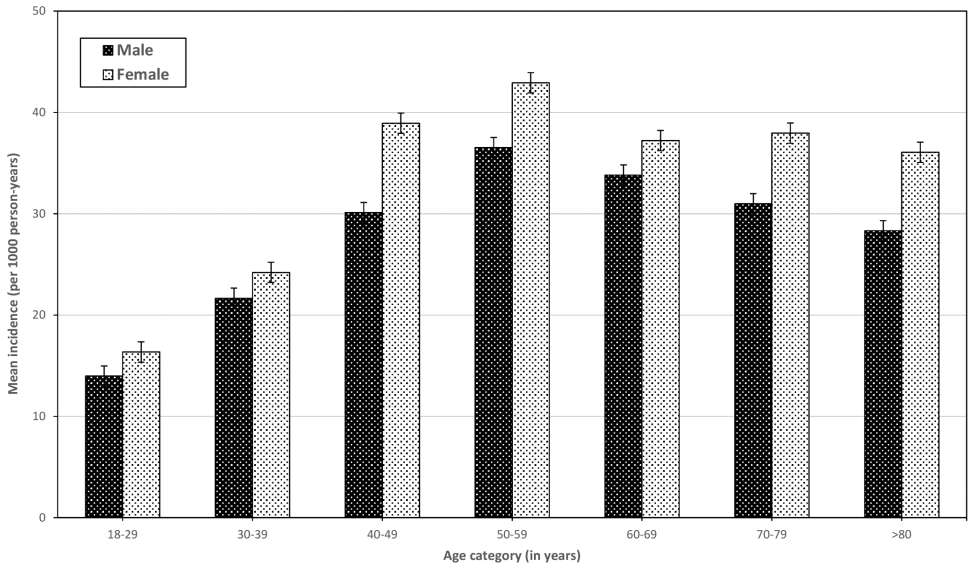

Figure 1. Sex- and age-specific mean incidence rates of shoulder pain (2012–17).

Table 1. Management of shoulder pain in the first consultation in general practice (2012–17)

Baseline characteristics	Wait-and-see (n = 143)	Medication (n = 461)	Physiotherapy (n = 178)	Injection (n = 127)	Imaging (n = 78)	Full sample (n = 916)
Gender						
Male	61 (43)	197 (43)	64 (36)	43 (34)	36 (46)	381 (42)
Female	82 (57)	264 (57)	114 (64)	84 (66)	42 (54)	535 (58)
Age categories (years)						
18–39	28 (20)	94 (20)	35 (20)	8 (6)*	15 (19)	170 (19)
40–59	59 (41)	225 (49)	85 (48)	55 (43)*	36 (46)	427 (47)
≥60	56 (39)	142 (31)	58 (33)	64 (50)*	27 (35)	319 (35)
Duration of symptoms						
Acute (<6 weeks)	47 (33)	233 (51)*	46 (26)	33 (26)*	27 (35)	350 (38)
Non-acute (≥6 weeks)	26 (18)	87 (19)*	47 (26)	33 (26)*	25 (32)	209 (23)
Unknown	70 (49)	141 (31)	85 (48)	61 (48)	26 (33)	357 (39)
History of shoulder complaints						
Present	41 (29)	127 (28)*	50 (28)	57 (45)*	22 (28)	285 (31)
Not present	102 (71)	334 (72)*	128 (72)	70 (55)*	56 (72)	631 (69)

Note. Data are presented as numbers (percentages). More than one policy could be applied by the GP per consultation. Twenty-four patients had a referral to secondary care in the first consultation and were not included in this table.

*A χ^2 test found a significant difference in management between groups based on baseline characteristics.

(26.8%). Tramadol was given in only 0.6% of the cases and none of the patients received a strong opioid. A corticosteroid injection was administered in 13.9% (n = 127) of the patients and 19.4% (n = 178) were referred directly to a physical therapist. Only 8.5% (n = 78) of the patients received some form of additional diagnostic imaging, mostly X-ray (66.3%), ultrasound (32.5%) or a combination of these (13.5%). A total of 24 patients (2.6%) were referred to secondary care at the first consultation, in most cases to an orthopaedic surgeon (83.3%). In 57.1% of the cases (n = 604), the management by the GP was in line with the first step recommended by the Dutch guideline (Table 1).

The administration of corticosteroid injections in the first consultation was significantly higher in the older age groups: a total of 64 injections (20%) in the ≥60 age group compared with 55 (13%) (χ^2 = 12.0, in the 40–59 age group) and 8 (5%) in the 18–39 age group, χ^2 (2, N = 127) = 22.5, P < 0.001. Furthermore, the ≥60 age group were prescribed significantly less oral medication (45%) compared with the 40–59 age group (53%) and the 18–39 age group (55%), χ^2 (2, N = 461) = 6.9, P = 0.003 (Table 1).

Patients with reported acute complaints (<6 weeks) were treated with oral medication significantly more (67%) in the first consultation compared with patients who reported non-acute complaints (≥6 weeks) (42%), χ^2 (1, N = 461) = 33.3, P < 0.001. Patients who reported non-acute complaints received significantly more referrals to physiotherapy (23%) compared with patients with reported acute complaints (9%), χ^2 (1, N = 178) = 8.2, P = 0.004. Furthermore, non-acute complaints received more often a injections (16%) compared with patients with reported acute complaints (13% respectively), χ^2 (1, N = 127) = 5.1, P = 0.024 (Table 1).

Patients with a history of shoulder complaints were treated significantly less with oral medication (45%) compared with patients without a history of shoulder complaints (53%), χ^2 (1, N = 461) = 5.5, P = 0.019. Patients with a history of shoulder complaints received significantly more an injection (20%) in the first consultation compared with patients without a history of shoulder complaints (11%), χ^2 (1, N = 127) = 13.0, P < 0.001 (Table 1).

Follow-up consultations

Compared with the first consultation, in the next, follow-up consultation GPs administered significantly more corticosteroid injections (14% and 26%, respectively), χ^2 (1, N = 916) = 29.1, P < 0.001 and referred more patients to physiotherapy (19% and 24%, respectively), χ^2 (1, N = 916) = 3.8, P = 0.05 (Fig. 2). Patients whose complaint was managed with a wait-and-see policy or a referral to a physiotherapist in the first consultation were less likely to return for a second consultation [odds ratio (OR) = 0.7, 95% CI 0.5–1.0] within the 12 months follow-up period. However, if an injection was administered in the first consultation, the patient was more likely to have a second consultation (OR = 1.5, 95% CI 1.0–2.3) (Fig. 3 and Table 2).

Discussion

Summary

In this study, we found that the mean incidence rate of shoulder pain in general practice over the years 2012–17 was 30.3 per 1000 person-years. Women (36.1 per 1000 person-years) had a higher incidence rate compared with men (28.3 per 1000 person-years). There was a peak incidence at the age of 50–59 for both women (42.9 per 1000 person-years) and men (36.5 per 1000 person-years).

This study found that more than half of the patients consulted their GP only once and for each consecutive consultation there was a substantial decrease in the number of patients.

For most patients the first step in the guideline—a wait-and-see policy or prescription of pain analgesics—was applied in the first consultation. Nevertheless, in no less than 42.9% of the cases the GP decided to start with the second step in the guideline, and

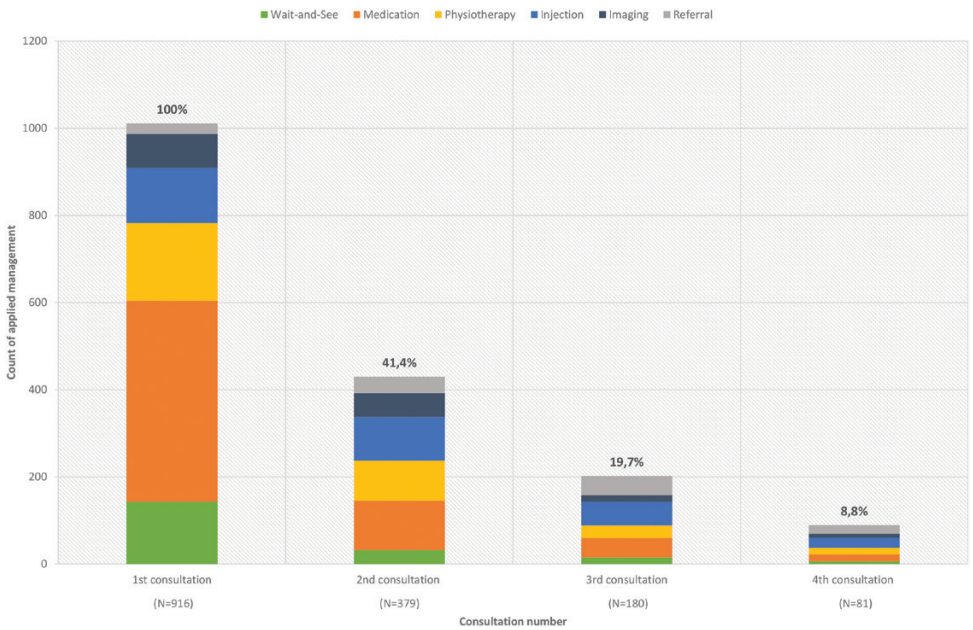

Figure 2. Management of shoulder pain per consultation (2012–17). *Note.* Patients could be treated according to more than one policy; consequently, the total count of applied management policies may exceed the total number of patients at a given consultation. Percentages are based on number of patients at the first consultation.

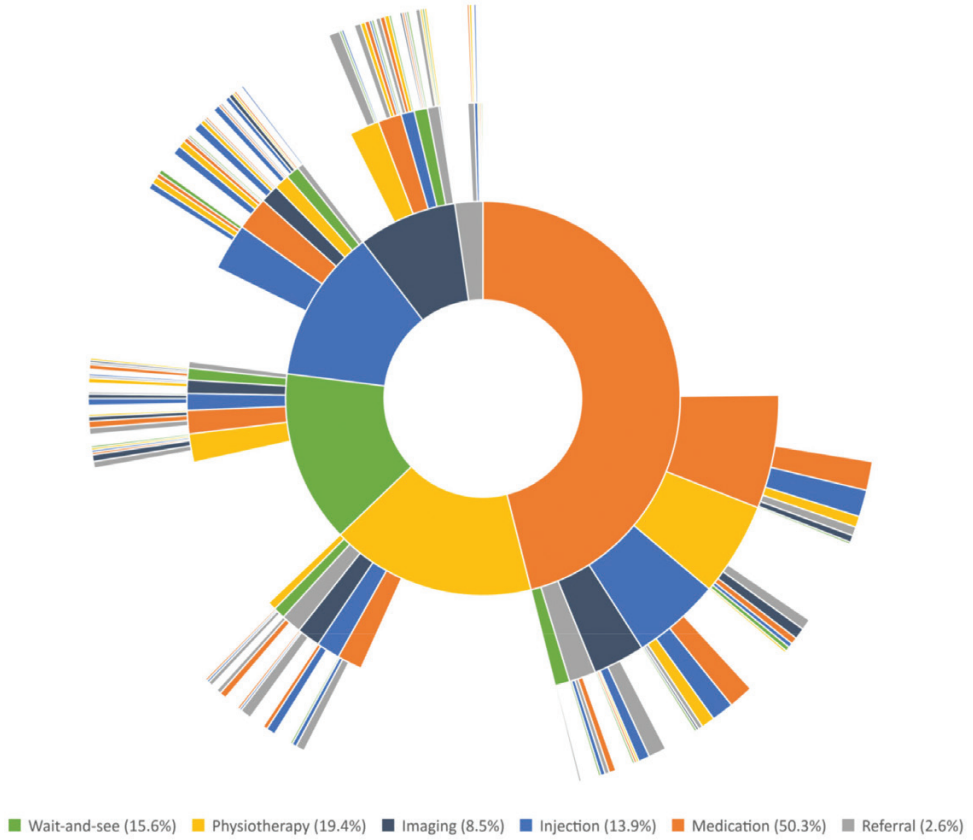

Figure 3. Hierarchical visualization of the management of shoulder pain per consultation (2012–17). *Note.* The inner circle represents the policy in the first consultation (N = 916 patients). The second circle represents the policy in the second consultation (N = 379) and the third circle represents the policy in the third consultation (N = 180). Percentages are based on the management in the first consultation. Patients could be treated according to more than one policy; consequently, the total percentage may exceed 100%.

Table 2. Multivariate logistic regression analysis of the likelihood of a follow-up consultation based on the management in the first consultation

Management first consultation	OR	95% CI for OR		*P* value
		Lower	Upper	
Wait-and-see	0.664	0.449	0.982	0.04
Physiotherapy	0.674	0.469	0.969	0.03
Corticosteroid injection	1.521	1.021	2.266	0.04

Note. N = 912. Four patients received a referral to physiotherapy and a corticosteroid injection and were excluded in the analysis.

administered an injection or referred the patient to secondary care already in the first consultation.

Strengths and limitations of the study

A major strength of this study is its retrospective design. GPs could not be influenced in their management approach by this study design, therefore it can be assumed that the study provides a true representation of the management of shoulder complaints in general practice. In addition, all Dutch citizens are obliged to be registered with a general practice, which makes this study illustrative for the management of shoulder complaints in general practice. However, in the Netherlands patients have direct access to a physiotherapist without requiring a referral from the GP. Therefore, it is possible that patients had already received treatment by a physiotherapist before visiting the GP. This could have influenced the management choice made by the GP at the first consultation. These patients were probably less likely to get another referral to a physiotherapist and more likely to receive a more intensive treatment, according to a study done by Feleus *et al.* (14).

The RPCD was very suitable for determining the incidence rate and describing the management policy applied by the GPs for patients with new shoulder complaints. However, the quality of the data is dependent on the correct registration of information by the GP. This potential drawback was resolved by using the patient's full medical file, including the free text written by the GP at each consultation. In total, 84 patients from the random selection of 1000 cases were found to be incorrectly coded by the GP and therefore excluded for further analysis. Consequently, the positive predictive value of the search algorithm is good (91.6%). However, the search algorithm could not be tested for its sensitivity, and incident cases could also have been missed due to incorrect coding by the GP.

The medical record contains limited information on the severity of the complaints, such as a score for pain or function and specific diagnosis of the shoulder complaints. Although the guideline does not suggest the need for a specific diagnosis in the management of shoulder complaints, it can still be postulated that the GP tailors the management of individual patients based on the specific diagnosis of the patient.

Comparison with existing literature

Incidence

The found incidence rate of shoulder complaints of 30.4 per 1000 person-years confirms that shoulder complaints is the third most common musculoskeletal disorder. In comparison, the most common musculoskeletal disorders, low back pain and knee complaints have a reported incidence of 48.5 per 1000 person-years and 35.2 per 1000 person-years in the Netherlands, respectively (4).

Our found incidence rate of shoulder complaints in general practice is in line with three other Dutch studies. Greving *et al.* (2), reported an incidence of 29.3 per 1000 person-years. However, they included patients as an incident case only once during a 9-year follow-up. Feleus *et al.* (5) also reported a similar incidence rate of 29.5, although they only included patients aged 18–64. Bot *et al.* (1) found a considerably lower incidence rate of 19.0 per 1000 person-years. However, they used a prospective study design and did not use any age restriction in the inclusion of patients, which could explain the differences in determined incidence rates.

Our findings of a higher incidence rate for women compared with men and a peak incidence at the age of 50–59 are in accordance with the studies by Bot *et al.* (1), Greving *et al.* (2) and Feleus *et al.* (5), who all found a higher incidence among women compared with men, and a peak incidence at the age of 45–64.

Management

Our study found that for 57.1% of the patients a wait-and-see policy or prescription of pain analgesics was used in the first consultation. Dorrestijn *et al.* (15) found a percentage as high as 79% for a wait-and-see policy or prescription of pain analgesics at the first consultation. This difference could be explained by differences in the inclusion criteria. Dorrestijn *et al.* (15) only included patients who had never consulted the GP for shoulder issues before, while our study included patients who had a symptom-free interval of at least 1 year. Patients who had recurrent complaints following (failed) previous treatments are treated more intensively, according to Feleus *et al.* (14). Therefore, it could be that a wait-and-see policy or prescriptions of pain analgesics were applied less frequently in our study population.

Consultation rates

We found that more than half of the patients (58.8%) consulted their GP only once. This is in line with Paloneva *et al.* (16) who reported a proportion of 51%, although they also included prevalent cases, while our study only focussed on incident cases. Greving *et al.* (2) reported a percentage of 48% of patients who had consulted their GP only once. This difference can be explained by the design of the study, which had a follow-up time of 10 years, while our study had a follow-up time of 1 year.

Paloneva *et al.* (16) reported an average of 1.5 consultations per year per patient, where our study found an average of 1.8 consultations per year per patient. This difference could be explained by the fact that Paloneva *et al.* included prevalent cases, while our study only included incident cases.

Implications of this study

This study showed a wide variety of treatment policies applied by GPs. A number of patients are referred to physiotherapy or receive an injection already in the first consultation, which is not in line with the recommended stepwise approach in the current guideline. This mismatch between the best available evidence and the actual management of shoulder complaint has also been reported by previous studies on GP management of shoulder complaints (17,18). A possible explanation for this discrepancy could be due to barriers perceived by GPs in adhering to the guideline (19,20). A qualitative study on the perspective of Dutch GPs on diagnosing shoulder pain reports that some GPs perceive guideline recommendations as incomplete and superficial. Furthermore, this study found that GPs reported a lack of applicability of the guideline, specifically to the individual patient (21). In addition, studies have shown that GPs lack confidence in diagnosing shoulder pain, which could be associated with the high variability of management decisions (21,22). Therefore, further research on the diagnosis and management of shoulder complaints should be done to overcome this uncertainty and possibly bridge the gap between the guideline recommendations and the actual management by the GP.

Declaration

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Ethical approval: this study was approved by the Governance Board of Rijnmond Primary Care. Medical ethical approval was not necessary since all patient data were pseudonymized.
Conflict of interest: the authors declare no conflict of interest.

Data availability

Data not publically available.

References

1. Bot SD, van der Waal JM, Terwee CB *et al.* Incidence and prevalence of complaints of the neck and upper extremity in general practice. *Ann Rheum Dis* 2005; **64**(1): 118–23.
2. Greving K, Dorrestijn O, Winters JC *et al.* Incidence, prevalence, and consultation rates of shoulder complaints in general practice. *Scand J Rheumatol* 2012; **41**(2): 150–5.
3. Luime JJ, Koes BW, Hendriksen IJ *et al.* Prevalence and incidence of shoulder pain in the general population; a systematic review. *Scand J Rheumatol* 2004; **33**(2): 73–81.
4. *Incidentie en prevalentie van gezondheidsproblemen in de Nederlandse huisartsenpraktijk in 2018*. www.nivel.nl/nl/nivel-zorgregistraties-eerste-lijn/incidenties-en-prevalenties (accessed on 1 March 2020).
5. Feleus A, Bierma-Zeinstra SM, Miedema HS *et al.* Incidence of non-traumatic complaints of arm, neck and shoulder in general practice. *Man Ther* 2008; **13**(5): 426–33.
6. Linsell L, Dawson J, Zondervan K *et al.* Prevalence and incidence of adults consulting for shoulder conditions in UK primary care; patterns of diagnosis and referral. *Rheumatology (Oxford)* 2006; **45**(2): 215–21.
7. Kuijpers T, van der Windt DAWM, van der Heijden GJMG, Bouter LM. Systematic review of prognostic cohort studies on shoulder disorders. *Pain* 2004; **109**(3): 420–31.
8. Smith-Forbes EV, Moore-Reed SD, Westgate PM, Kibler WB, Uhl TL. Descriptive analysis of common functional limitations identified by patients with shoulder pain. *J Sport Rehabil* 2015; **24**(2): 179–88.
9. *NHG Standaard Schouderklachten*. https://richtlijnen.nhg.org/standaarden/schouderklachten (accessed on 1 March 2020).
10. van der Lei J, Duisterhout JS, Westerhof HP *et al.* The introduction of computer-based patient records in The Netherlands. *Ann Intern Med* 1993; **119**(10): 1036–41.
11. Vlug AE, van der Lei J, Mosseveld BM *et al.* Postmarketing surveillance based on electronic patient records: the IPCI project. *Methods Inf Med* 1999; **38**(4–5): 339–44.
12. Lamberts H, Wood M. *ICPC, International Classification of Primary Care*. USA: Oxford University Press, 1987.

13. Ng HKT, Filardo G, Zheng G. Confidence interval estimating procedures for standardized incidence rates. *Comput Stat Data Anal* 2008; **52**(7): 3501–16.
14. Feleus A, Bierma-Zeinstra SM, Bernsen RM *et al*. Management decisions in nontraumatic complaints of arm, neck, and shoulder in general practice. *Ann Fam Med* 2009; **7**(5): 446–54.
15. Dorrestijn O, Greving K, van der Veen WJ *et al*. Patients with shoulder complaints in general practice: consumption of medical care. *Rheumatology (Oxford)* 2011; **50**(2): 389–95.
16. Paloneva J, Koskela S, Kautiainen H, Vanhala M, Kiviranta I. Consumption of medical resources and outcome of shoulder disorders in primary health care consulters. *BMC Musculoskelet Disord* 2013; **14**: 348.
17. Buchbinder R, Staples MP, Shanahan EM, Roos JF. General practitioner management of shoulder pain in comparison with rheumatologist expectation of care and best evidence: an Australian national survey. *PLoS One* 2013; **8**(4): e61243.
18. Naunton J, Harrison C, Britt H, Haines T, Malliaras P. General practice management of rotator cuff related shoulder pain: a reliance on ultrasound and injection guided care. *PLoS One* 2020; **15**(1): e0227688.
19. Zwolsman S, te Pas E, Hooft L, Wieringa-de Waard M, van Dijk N. Barriers to GPs' use of evidence-based medicine: a systematic review. *Br J Gen Pract* 2012; **62**(600): e511–21.
20. Lugtenberg M, Burgers JS, Besters CF, Han D, Westert GP. Perceived barriers to guideline adherence: a survey among general practitioners. *BMC Fam Pract* 2011; **12**: 98.
21. Ottenheijm RP, Hesselmans NJ, Kemper A *et al*. GPs' perspectives on the diagnostic work-up in patients with shoulder pain: a qualitative study. *J Eval Clin Pract* 2014; **20**(3): 239–45.
22. Lewis J. Rotator cuff related shoulder pain: assessment, management and uncertainties. *Man Ther* 2016; **23**: 57–68.