Outcome Expectations in Patients with Persistent Neck, Back and Shoulder Complaints

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Doctoral Thesis

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This Ph.D. project started as a student assignment in the medical program at the University of Oslo in 2011. The premature idea was to explore Physical Medicine and Rehabilitation patients' outcome expectations. Following the pilot study, it was suggested that the project was extended given its interesting results. A Ph.D. idea was born, and the project was enlarged with a second patient cohort and two more articles. I'm grateful for the "along the way" approach of the project, enabling learning in each step from idea to final manuscripts. However, in hindsight, this running process has revealed that certain steps could have been administered differently. Despite (or perhaps in regard?) of beginners slips, blunders and retrospect clarity, I certainly have learned a lot, and this is what I most proud of.

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1 Abstract

Over the last decades, research has gradually increased its focus on patients' expectations and their potential clinical importance. Most noteworthy, perhaps, is the suggested association between patients' expectations and treatment outcomes.

The overall aims for the current thesis were to assess outcome expectations for pain and functioning among patients with persistent neck, back and shoulder complaints. Further, changes in expectations during a physical medicine and rehabilitation (PMR) appointment, as well as expectations influence on pain and functional improvement over six months, were assessed. Few musculoskeletal expectation measurements exist, hence, a questionnaire simultaneously measuring present and expected pain and function status on equal scales was constructed (PainFunction), and an existing measure (Patient Shoulder Outcome Expectancies (PSOE)) was translated to Norwegian. Both questionnaires were tested in a pilot study, and thereafter utilized to measure patients' expectations.

Both measures (PSOE and PainFunction) were shown to have acceptable reliability scores and were reported to be comprehensible by the patients during the pilot testing of the two questionnaires. Close to half the population (40%) expected their pain and functional status to remain unchanged by the time of their PMR appointment. Secondly, expectations were considered malleable, as approximately one-third of the patients had changed their expectations after the PMR appointment. The shoulder patients were more optimistic regarding improvement than patients with neck and back complaints. Apart from this, no close associations between expectations, or changes in expectations, and demographic or other individual factors were found. Lastly, patients' expectations were not associated with pain and functional improvement after six months. However, the associations between expectations and outcome suffers from inconsistent evidence in the literature. Overall, for further improving our knowledge of clinical applicability of patients' expectations, universal definitions and measurement methods are required in expectation studies to increase comparability among studies with greater precision.

2 Abbreviations

GP	General Practitioner
HSCL-10	The Hopkins Symptom Checklist - 10 items
ICC	Intraclass Correlation Coefficient
ICD-10	International Classification of Diseases, Tenth Edition
MAR	Missing at Random
MCAR	Missed Completely at Random
MNAR	Missed not at Random
NDI	Neck Disability Index
NPS	Number of Pain Sites
NRS	Numeric Rating Scale, 11NRS: 11-point Numeric Rating Scale
NOK	Norwegian Kroners
ODI	Oswestry Disability Index
OUH	Oslo University Hospital
PMR	Physical Medicine and Rehabilitation
PSOE	Patient Shoulder Outcome Expectancies
RA	Rheumatoid Arthritis
SD	Standard Deviation
SLT	Social Learning Theory
SPADI	Shoulder Pain and Disability Index
VAS	Visual Analogue Scale
WHO	The World Health Organization
YLDs	Number of Years Lived with Disability

3 Included Papers

Paper I

Expectations for treatment outcomes in neck/back patients regarding improvements in pain and function: A cross-sectional pilot study.
Sigrid Skatteboe, Cecilie Røe, Morten Wang Fagerland, Lars-Petter Granan.
Eur J Phys Rehabil Med. 2014;Vol. 50:649-56 (1).

Paper II

Expectations of pain and functioning in patients with musculoskeletal disorders: A cross-sectional study.
Sigrid Skatteboe, Cecilie Røe, Morten Wang Fagerland, Lars-Petter Granan.
BMC Musculoskelet Disord. 2017; 18(1):48 (2).

Paper III

The influence of expectations on improvement in pain and function in patients with neck/back/shoulder complaints: A cohort study.
Sigrid Skatteboe, Cecilie Røe, Morten Wang Fagerland, Lars-Petter Granan.
Eur J Phys Rehabil Med. 2017 (3)

4 Introduction

Musculoskeletal disorders are among the leading causes of disabilities worldwide, with neck, low back and shoulder pain being the most frequently affected body areas (4-6). Disabilities and pain present both physical and psychological challenges for the affected individual, including barriers related to the surroundings, as well as economical burdens for both the person and society (7).

Over the last decades, research has increasingly assessed the impact of psychological and social aspects of coping with musculoskeletal pain in search of improved treatment results (8). In this regard, a growing body of literature has explored possible clinical applications of musculoskeletal patients' expectations (9). Most noticeable is perhaps the suggested association between positive expectations and improved treatment outcomes (10-24), yet this association suffers from inconsistent evidence (25-29). However, patients' expectations are proposed to be otherwise clinically relevant by contributing to improved patient communication (30), as well as encouraged adherence and compliance to treatment interventions (9, 31).

Despite increased research attention, literature concerning patients' expectations is limited and heterogeneously assessed (32). Indeed, greater knowledge is required for future endeavors of clinical incorporation of expectations within musculoskeletal health care (33). The aim for the current thesis is to assess pain and functional expectations among patients with persistent neck, back and shoulder complaints. Furthermore, this thesis will assess whether expectations change during a PMR appointment, and if expectations vary in relation to patient characteristics and different patient groups. Lastly, patients' expectations possible influence on pain and functional outcomes will be assessed.

4.1 Disability

Generally, disability is defined as "a difficulty in function at the body, personal or societal levels in one or more life domains, as experienced by an individual with a health condition in interaction with contextual factors" (34). The World Health Organization (WHO) presents in the "World Report on Disability" (2011) that approximately 15%-19% of the world's population lives with a disability, and 2%–3% suffer from severe disabilities (35). In Norway, approximately 15%-20% of the adult population is reported to live with a disability, measured towards either work capacity, quality of life and/or living conditions (36-38). However, both international and national prevalence estimates suffer from disparate measurement approaches, and the interpretation of the disability term depends on the aspect of examination: activity limitations, restriction, related health condition or environment factors (35). The aforementioned definition implicates that a clear cut-off and standardization of disabilities does not exist, as underlying causes of disabilities are diverse and span from congenital to acquired disorders with physical, cognitive and/or mental problems (39). The level of impairment is not dependent on medical condition alone (35); several factors, such as age, gender, stage of life, socio-economic status and culture, are shown to influence the level of disability, as well as individual perception of the condition (35). The main challenge could also be the environment (40), as surrounding factors such as social relations, home life, occupational status and economy also affect the person with a disability (41). Irrespective of theoretical approach towards disability, the global burden of disabilities is enormous (4). According to the Global Burden of Disease Study (2015), musculoskeletal disorders are the major contributor to number of years lived with disability (YLDs) in adults > 30 years of age, with low back and neck pain being the single-largest causes. Other musculoskeletal diseases are among the top five causes of YLDs, although some variations are found within different age clusters (4).

4.2 Musculoskeletal injuries, disorders and complaints

Musculoskeletal disorders comprise an assorted group of conditions with varying pathophysiology (42). Musculoskeletal problems include injuries, disorders and complaints (shortened to musculoskeletal disorders in the present thesis). Musculoskeletal disorders arise from three main causes: traumatic events, musculoskeletal diseases or unusual or repetitive movements (43). For an affected individual, disability challenges of various degrees are common (4); reduced muscle strength, endurance and sensory problems are frequent (44). However, pain is generally the most prominent symptom (43). Muscles, tendons, bones and joints are all supplied by sensory nerves that may activate nociceptors and elicit pain (45). Pain is defined as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage" (46). The human pain sensation process is complex and includes both genetic and environmental factors (47), influenced by past experiences, as well as physiological, psychological, social and cultural factors (48). According to the definition of pain quoted above, pain may occur with or without tissue damage; thus, psychosocial factors are deemed important, particularly regarding development of persistent pain associated with disabilities (49). Besides pain and disabilities, musculoskeletal complaints are economically burdensome for the affected individual and society (7). In Norway, in 2009, the total health service costs for musculoskeletal disorders treatments were approximately 14 billion Norwegian Kroners (NOK), whereas the costs for sickness benefits related to musculoskeletal disorders were over twice as large (over 30 billion NOK) (6). Musculoskeletal disorders represent the most common cause of sick leave and disability retirement in Norway (5).

4.3 Neck, back and shoulder pain

In Norway, approximately 75%-80% of the general population report experiencing musculoskeletal pain over the last month (6, 50), and approximately 50% report pain over a minimum of three months in the last year (51). In 2012, 18% of men and 27% of women were registered with a chronic musculoskeletal disorder (5). Among the

musculoskeletal disorders, low back pain was the most frequent complaint, followed by neck and shoulder pain (5, 6, 50). Thoracic pain was less frequent and often associated with concomitant low back or neck pain (52). The point prevalence of neck pain was estimated to be 8% (6%-22%) with a lifetime prevalence of 49% (14%-71%) (53). For low back pain, the point prevalence was 18% (Standard Deviation (SD) 11.7) with a lifetime prevalence of 39% (SD 24.3) (54). Lastly, shoulder pain point prevalence was estimated to be 7%-26% with a lifetime prevalence of 7%-67% (55). In one community in Norway, the one-year prevalence was estimated to be 48%, 53% and 47% for neck, low back and shoulder complaints, respectively (56). The wide range of prevalence estimates are related to differing study methodology and diagnostic criteria (53). Although the majority of neck (57), low back (58) and shoulder pain (59) episodes are self-limiting, development towards persistent states occurs (57, 59-61). The duration of the complaint is frequently divided into acute conditions with a duration of less than six weeks, sub-acute pain lasting between six and twelve weeks, and chronic or persistent pain preceding twelve weeks (62). Approximately 50% of neck patients (57) and one-third of low back patients experience recurrences during the first year (60), whereas 10%-15% of low back pain patients progress towards chronic states (61). Approximately 40% of shoulder pain conditions are not completely resolved after one year (59). However, assessment of the prevalence and incidence of persistent pain is also challenging with varying estimates in the literature, as well as the difference between the prevalence of recurring, fluctuating and persistent pain being undetermined (63). In Norway, general practitioners (GP) treat the majority of patients with neck, low back and shoulder complaints. Nevertheless, patients having problems with durations over three months, severe pain, functional impairment and/or need for additional investigations are frequently referred to specialist/secondary care, including PMR outpatient clinics (64).

Neck and back pain may arise independently or combined from traumas, disk pathology (disk disruption, fissures or collapse), disk herniation, facet joint degeneration or canal stenosis to cause radicular pain (65). However, less frequent conditions, such as underlying cancer, fractures, osteomyelitis and ankylosing spondylitis do occur (62, 66, 67). However, the lack of clear pathology is common for both neck (66) and back pain (62). For neck pain, a classification regarding severity is

recommended: grade I-II implies no signs of pathology without or with affection of daily living, whereas grade III-IV includes minor to major signs of pathology (68). Grade I-II is common (95% in an Asian population (69)), and does majorly consist of unspecified neck pain. Resembling the neck categorization, persistent low back pain is often categorized as non-specific low back pain (approximately 85%), low back pain associated with radiculopathy or spinal stenosis, or low back pain associated with other specific causes (62, 67). Shoulder pain arises from the tissue surrounding the joint such as tendons, ligaments, bursa's, muscle, bones and/or cartilage, in variations of inflammatory, ischemic, degenerative and/or traumatic pathophysiology (70). The main causes of persistent pain in specialized care are subacromial syndrome (36%), myalgia (17%), adhesive capsulitis (11%), full thickness rotator cuff tear (8%) and osteoarthritis (4%), although other conditions, such as labral tears and neurological conditions do occur (71). For shoulder conditions, several classifications exist (pathological, anatomical or etiological) but none is implemented overall (70).

4.4 Prognostic factors for neck, low back and shoulder pain

Prognostic factors are confirmed elements that predict the course of recovery or chronification of a given condition (72). Despite a manifold of suggested prognostic factors, few new, evidence-based systematic reviews present prognostic factors for back pain seen as one united group, and this is similar for neck pain and especially shoulder pain. Causality assumptions require well-designed longitudinal studies, yet the methodology documented is overall inconsistent (61, 72, 73).

Several factors are suggested to have prognostic value in the three chronic populations. Firstly, poorer prognosis are seen with increased age in patients with neck (74) and shoulder pain (59), yet age is not found to predict prognosis for patients with low back pain (58). Prognostic differences are not demonstrated between genders in neck (72) or low back pain populations (58), and the evidence is conflicting for shoulder pain (59, 73). Smoking habits and obesity were not associated with poorer prognosis for low back pain patients (58); however, this was not assessed in recent systematic reviews for neck (72) and shoulder pain (59, 73). Education level

was not associated with prognosis in low back (58) or shoulder patients (59), and not contained in the neck pain review (72).

The character of the present complaint is of prognostic relevance for all three body areas. For neck pain patients, the occurrence of prior neck pain, pain intensity (74), duration of the current problem and poor general health are associated with worsened outcomes (72). For low back pain patients, low general health status, increased impairment and higher pain levels are associated with poorer outcomes (58, 61). Shoulder pain patients with reduced general health, longer duration of complaint, higher disability scores, higher intensity of shoulder pain and regular usage of analgesics also have poorer prognosis (59).

Work related factors are generally not found associated with outcomes in neck (72) or low back patients (61). For shoulder pain patients, perception of high work demands relate to poorer outcomes (59), yet repetitive movements and frequency/duration of movements (59) do not predict outcomes. The evidence of the prognostic value for general physical activity in leisure time is inconclusive for neck (72), low back (61) and shoulder pain patients (73).

"Emotional distress" is a composition of psychological distress with depressive symptoms and anxiety (75), reported to relate closely to persistent musculoskeletal pain (76), and in particular the chronification for neck and low back conditions (77). Furthermore, higher levels of "fear avoidance," a concept considering how fear of pain may lead to catastrophizing and negative appraisals regarding pain and health behaviors (78), are found to predict disability in neck (74) and low back pain (61). "Coping" implies patterns of effort required to manage difficulties in life (79), and is often conceptualized as how patients cognitively and behaviorally endure pain (80). Maladaptive coping strategies, such as passive coping, anger, frustration or worrying, are the most important baseline predictors for persistent low back (58) and neck pain (72). However, for shoulder patients, the occurrence of psychosocial factors (depression, pain catastrophizing, somatization, emotional distress) do not relate to prognosis (59). Lastly, a review in the Lancet (2012) (61) suggested that low recovery expectations increase the risk of poorer outcomes in low back patients, a conclusion that has been supported by two other low back pain reviews (24, 31).

4.5 Management of persistent neck, low back and shoulder complaints

The assessment of persistent complaints in the neck, low back and shoulder area in PMR clinics depend upon the underlying condition, although some overall approaches exist. According to the European White Book of PMR (81), the main aims are to treat underlying pathology, reduce impairments and/or disability, prevent/treat complications and improve function and activity. It is emphasized that these aims should be assessed in account of the individual's personal, cultural and environmental context (81).

In a general assessment, a thorough history report with a focus on the present problem, prognostic factors and the psychosocial burden of the disorder is emphasized for neck (82), low back (61) and shoulder (83) conditions. A proper clinical examination (61, 82, 84) is required to define further needs for additional investments, such as radiology or laboratory testing (61, 70, 82). "Patient-centered care" is a holistic approach that seeks to establish a partnership among practitioners and patients, ensuring that the delivered care is attentive to the needs and preferences of patients (85). Patient-centered care are advised to include "shared decision making," a process where healthcare choices is made jointly by the patient and the practitioners based on proper information (86). This is recommended for neck (74) and low back pain patients (87), and is presumably equally relevant in the management of shoulder pain patients.

Physical activity includes a specter of interventions that span from simple advises towards individual or group-based structural exercise programs targeting the whole body or specific muscle groups and body areas (88). There is consistent evidence favoring physical activity and exercises as main interventions among all age groups with musculoskeletal disorders (89), persistent pain (88) and subjects with physical disabilities (90). Therefore, guidelines for persistent neck (74), low back (87) and shoulder pain (83) all recommend physical activity and exercise programs. Furthermore, physical activity and exercise is often included in multidisciplinary rehabilitation interventions, often combined with psychological, educational and/or

other components (91). Such interventions may be delivered in hospital or community-based settings, and have been proven effective for neck (92), low back pain (87) and shoulder pain patients (93).

For additional management of low back pain, therapeutic interventions that approach the psychological component of the complaint are developed. Possibly most prevailing are cognitive behavioral therapy approaches (94), which aim to adjust maladaptive thoughts and feelings about the pain and disability (95). Cognitive behavioral therapies have been shown to elicit small to moderate effects in treatment for chronic pain (96) and low back pain (87), whereas the evidence is uncertain for neck pain (74) and limited literature exist for shoulder pain.

Treatment success in the management of patients with chronic complaints often involves initiation, as well as maintenance, of changes in a patient's behaviors (97, 98). However, this is challenging, for instance are adherences and compliance to physical activity programs often low in patients with chronic conditions (99). Psychological approaches, such as self-management programs and cognitive behavioral therapies also require changes in behavior patterns (97). Patients' expectations, self-efficacy and motivation are suggested to hold central roles in succeeding with clinical interventions directed at changing a person's behavior in healthier directions (97, 100). Patients' expectations are proposed to be essential because patients' engagement and adherence to treatment interventions depends on hers/his beliefs of the importance and benefits of engaging. Patients are not likely to stay involved if it is not expected to be valuable and worth the effort (97). Additionally, patients' engagement in treatment interventions also rely on the patients beliefs concerning his/her ability to engage, covered by the concept self-efficacy, and the patients readiness for change, or motivation (97).

Self-efficacy (101) and motivation (102) is thoroughly investigated in diverse psychological and medical disciplines, documented important in management of chronic pain (103), including neck and back pain (104-106) and rehabilitation interventions (107). On the other hand, patients' expectations are less consistently investigated, and the research suffers from conceptual and methodological diversities

(32). Therefore, the current thesis intends to assess musculoskeletal patients' expectations.

4.6 Patients' expectations

Expectations arise from the Latin term "expectare", meaning "to look out for" (108). Health care expectancies or expectations (32) are commonly defined as "the general belief that a clinical outcome will occur" (109), although interpretations vary (9). Expectations should be differentiated from hope (110), beliefs, treatment satisfaction (111), preferences and requests (109). Patients' expectations have been theoretically explored as early as the 1950's (112). Possibly most prevailing, mainly within psychological research, is Bandura with the social learning theory (SLT), outlining the concept of "outcome expectancies" (113). SLT is found to be the most common theoretical framework in expectation studies (11), although the theoretical approaches overall are inconsistent (32). Over the last few decades, patients' expectations have received increased research attention, perhaps contrasting a previous mechanistic and biomedical-focused framework by exploring the psychological and social aspects of coping with persistent complaints (8). Patients' expectations are explored both within psychology (114) and in fields of somatic medicine, such as in several surgical approaches (115), heart diseases (116), stroke (117), cancer (118), obesity (119), chronic pain (120), musculoskeletal disorders (9) and rehabilitation intervention (121).

Overall, musculoskeletal patients' expectations are individual and dependent upon knowledge, values, needs and previous experiences derived from one's self and others (31, 122). The character and management of the current complaint, such as pain duration (123), previous medical history including health care experiences (124), as well as levels of fear of movement and coping strategies (16) also affect patients' expectations. Furthermore, patients' expectations are influenced by demographical and individual factors: lower expectations are seen with increased age (32), certain nationalities (125), lower education levels (126), married patients (124) and within patients with higher emotional distress (124) or depressive symptoms (126). Some variations of the content of expectations are seen between males and females (127,

128). However, the evidence behind expectations association to these factors is inconsistent. For instance, a recent summary (2012) supports few of the suggested associations, except from increased age and lowered expectations (32). Nevertheless, the theoretical framework concerning expectations is limited (32).

There is a growing body of literature exploring possible clinical applications of musculoskeletal patients' expectations. Inclusion of patients' expectations in clinical care is found to improve patient communication (30) and reduce misunderstanding (129) because if not asked, the physician and the patient might not have the same expectations (130). Clinicians are advised to promote reasonable expectations to the patients to optimize treatment outcomes, as unrealistic expectations are not beneficial for the upcoming health care process (9, 131). Overall, discussing patients' expectations enables clinicians to have a greater understanding of patients' concerns and preferences, which encourages shared decision-making between the clinician and the patient (132). Furthermore, expectations are, as mentioned previously, important in interventions attempting to change or improve patients' behaviors (97) because they contribute to enchanted adherence and compliance to treatment interventions (9, 31). Lastly, positive work return expectations are presented to facilitate return to work in low back pain patients (24, 133). Lastly, but most notable perhaps, patients' expectations are suggested associated with treatment outcomes; positively expecting patients are more likely to benefit from medical treatments (10, 11), whereas more negative expectations are associated with poorer clinical outcomes (18). This association between patients' expectations and outcomes are documented in painful musculoskeletal conditions irrespective of whether the treatment offered is surgical (22, 23) or non-surgical (12-21). This association has initiated hypotheses suggesting that clinician's may attempt to change patients' expectations to improve outcomes as an intervention (13, 31), although this has not yet been clinically realized. Additionally, the association between expectations and outcomes has generated hypotheses of expectations predicting prognosis for low back pain, and thus could be seen as a prognostic factor (31). However, several studies not supporting the association between expectations and outcomes exists (25-29).

Several authors and reviews have called for a classification of expectations because of the inconsistent approach seen in the literature (9, 10, 32, 33). Thompson and Sunil

(1995) proposed a four-fold division of expectations; “predicted expectations” defined as what an individual believes will occur; “ideal/value expectations” is what the individual desires or hopes will occur; “normative expectations” is what the individual believes should occur or is told will happen; and lastly, “unformed expectations” is what an individual is unaware or unwilling to express, either if they don't have any expectations or they don't know (122). Other categorizations have also been proposed. For instance, Haanstra et al. has suggested a distinction merely between “process” and “outcome” expectations (134). However, a taxonomy of expectations is by now not overall implied (32); the term is broad and presumably interpreted differently between patients, health care providers and researchers (134). In literature overall, including musculoskeletal research, expectations are unequally assessed with varying terminology in dissimilar populations with single or multidimensional measurements lacking psychometric properties (10, 33, 135). The different assessments of expectations range from considering expectations for specific outcomes (e.g., pain, body function or return to work), related to a particular treatments or interventions (e.g., physiotherapy, chiropractic etc.), towards open-ended questions assessing expectations for the future in general (33). Additionally, the majority of the musculoskeletal expectation research has focused on back pain, and few studies have focused on neck or shoulder pain. As the clinical course and treatment options vary across back, neck and shoulder pain patients, one may assume that expectations of outcome would also be different. Overall, there is a declared challenge to compare and aggregate/synthesize the evidence for patients’ expectations (10, 33, 135, 136).

The suggested association between expectations and treatment outcomes, as well as the role of expectations in patient communication and the contribution to treatment adherence and compliance, makes expectations clinically important. As pain and function are the most frequently reported outcomes in painful musculoskeletal conditions, expectations towards these outcomes were deemed most important. Thus, the level of expectations, the influence of a PMR consultation on patients’ expectations and the impact of expectations on treatment outcomes were explored.

5 Aims and Specific Research Questions

The overall aim for this research project was to assess expectations for pain and function among patients with persistent neck, back and shoulder complaints.

More specifically, the research aims were to:

- Pilot test two measurements for patients' expectations regarding pain and functional improvement, and assess neck and back patients' expectations before a PMR consultation (Paper I).
- Assess changes in expectations for pain and functional improvement before and after a PMR consultation among patients with neck, back and shoulder complaints (Paper II).
- Assess demographic and individual characteristics associated with expectations, and changes in expectations, among patients with neck, back and shoulder complaints (Papers I-II).
- Assess the influence of patients' expectations on pain and functional improvement six months after a PMR consultation among patients with neck, back and shoulder complaints (Paper III).

6 Methods

Study design

Paper I: Cross-sectional

Paper II: Cross-sectional

Paper III: Prospective cohort

6.1 Study setting and patient populations

Papers I-III:

Oslo University Hospital (OUH) serves the capital area (0.5 million inhabitants), and hosts regional referrals (2.6 million inhabitants). The OUH Physical Medicine and Rehabilitation (PMR) outpatient clinic receives adult patients (>15 years of age) with musculoskeletal complaints referred mainly by general practitioners (GP). The referred patients mainly have persistent complaints with durations longer than three months, and approximately 60% have had complaints for over one year. Back pain (with the vast majority being low back complaints), neck and shoulder pain are the most frequent referred complaints. The outpatient clinic consists of PMR specialists and physicians in PMR specialization. Additional multidisciplinary assessments may be conducted through the ward and/or the patients are subsequently returned to their GP.

6.2 Patient selection and data collection

Paper I:

In paper I, primary referred patients to the OUH PMR outpatient clinic with neck and back complaints that were over 15 years of age and spoke/understood Norwegian were eligible for inclusion. Exclusion criteria were change of primary diagnosis or lack of consent. Secretaries at the outpatient clinic randomly selected patients.

Papers II-III:

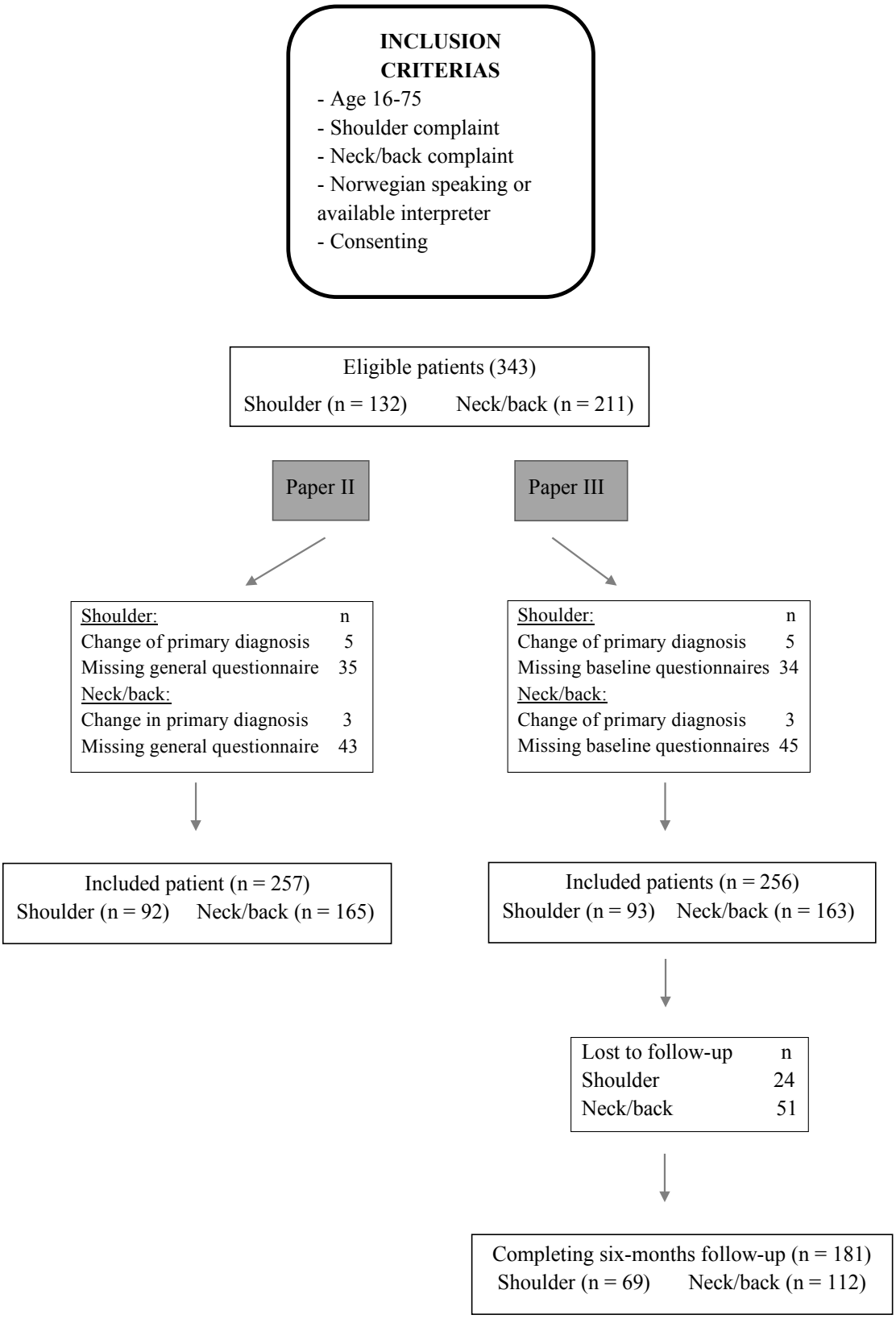
Papers II-III are derived from the same patient cohort. Primary referred patients with neck, back and shoulder complaints attending the OUH PMR outpatient clinic were eligible for inclusion (see flow-chart Figure I). The author of this thesis was responsible for the patient inclusion and data sampling.

Papers I-III:

As a routine, all patients attending the PMR outpatient clinic received a general questionnaire to record demographic characteristics (described below under "demographic and individual characteristics") by mail together with the appointment letter. This was returned on the appointment day, and the eligible patients were thereafter provided a consent letter. Consenting patients subsequently completed a questionnaire prior to their PMR appointment (Papers I-III). The patients in Papers II-III also completed a second questionnaire immediately after the PMR consultation, and they therafter received a follow-up questionnaire by mail six months after the consultation (Paper III).

Patients were included between January and June 2012 (Paper I), and secondly between January and June 2013 (Papers II-III), followed by a six-month follow-up from June 2013 to early 2014 (Paper III).

Figure I. Flow-chart for the patient inclusion in Papers II-III



Demographic and individual characteristics

Papers I-III:

Demographic data included age, gender, language (Norwegian/other), marital status (married/partner/single), level of education (more/less than 13 years), sick leave due to the present neck/back/shoulder problem (yes/no), smoking (yes/no) and daily use of analgesics (yes/no). Furthermore, the number of days between referral and the PMR consultation were recorded ("time of waiting") (Papers I-II), area of complaint (neck/back or shoulder) (Papers II-III), the physician's registration of the diagnose (International Classification of Diseases Tenth Edition (ICD-10)) neck/back diagnoses classified according to specificity (defined as "specific" or "unspecific," see the ICD-10 classification list in the Appendix) (Papers I-II) and amount of follow-up care at OUH (physiotherapy, secondary PMR assessments or referral two other medical specialties) after the first consultation (Paper III).

6.3 Assessments

Patients' Expectations, PSOE (Papers I-II):

With the intent of a general quantitative assessment of patients' outcome expectations, Patient Shoulder Outcome Expectancies (PSOE) (21) was the measurement deemed most suitable for Paper I. The questionnaire consists of three questions that assess patients' expectations for the overall problem, shoulder pain and their ability to move/use the shoulder in the next month. It is scored on a seven-point Likert scale, ranging from "much worse" to "much better". Evidence for the validity of the original PSOE was obtained from a confirmatory factor analysis where one factor accounted for 89% of the item variance, and the internal consistency was calculated with a Cronbach's alpha of 0.94 (21), which is considered a reliable score (137).

Unintentionally, in the preparation process, one of the seven categories ("a little better") was omitted (see Figure II).

Figure II. The original PSOE and PSOE in Papers I-II

PSOE, original

1. Compared with now, I think my shoulder problem overall next month will be:
□ Much worse □ Worse □ A little worse □ The same □ **A little better** □ Better □ Much better

PSOE, in paper I & II

1. Compared with now, I think my shoulder problem overall next month will be:

□ Much worse □ Worse □ A little worse □ The same □ Better □ Much better

Further development of the Norwegian version of the questionnaire continued with six categories. Still, the measure is referred to as PSOE in Papers I-II and the current thesis. To capture the neck/back population, the word "shoulder" was changed to "neck/back". Professional translators with native Norwegian and English backgrounds translated the complete instrument to Norwegian and back into English. The final version was adapted after a consensus meeting. Seven test patients on the PMR outpatient clinic evaluated the questionnaire (together with the PainFunction measure described below) by completing the questionnaire twice before their appointment with several hours between the two tests to serve as a distraction. The second time, the patients also evaluated the comprehensibility of each item, the adequateness of the response categories, if the items were considered important and if there were any other oppositions to the questionnaire. In the test-retest procedure, the SD of the difference between the two scores for each item ranged from 0 to 0.76 for each item in PSOE, and was 0.79 for the PSOE sum score. The infraclass correlation coefficient (ICC) (one-way random) was 0.57 for item two in PSOE, above 0.97 for the two other items and 0.93 for the sum score of PSOE, which indicate moderate and excellent reliability scores (138). Five of the seven test persons did not report any issues with the questionnaire and found it comprehensible. The last two persons reported that the measure was understandable, but said they found it difficult to define expectations without knowing the content of the PMR appointment. The utilized questionnaires were attached in all articles and can be found in the Appendix of the thesis.

Patients' Expectations, Pain Function (Papers I-III):

A supplement to the Norwegian version of the PSOE was developed in the preparation of Paper I. The intent was to categorize expectations with numbers in addition to the verbal formulation of the PSOE and to obtain a direct quantified comparison between present and expected pain and functional status. Numeric rating scales (NRS) are reliable, easy to administer, complete and frequently used in pain research (139). Thus, two sets of three 11-point numerically rating scales (11NRS) were constructed; the first set recorded the patients' present status and the second set addressed their expected status after seeing the physician. Within each set, two of the scales asked the patients to define their pain at rest and during activity, and the third scale asked about physical function. The scales were scored between zero (indicating "no pain/no movement limitations") and ten (indicating "worst possible pain/no movement possible"). A difference of approximately two or more points on a pain NRS can be interpreted to represent a clinically important difference according to Farrar et al. (140) and Childs et al. (141). The reliability and comprehensibility of the 11NRS was evaluated together with the PSOE, as described above. The SD of the difference between the two scores ranged from 0.38 to 0.69 on the individual scales, with a SD of 4.41 for the sum score. The ICC was above 0.94 for all scales, and 0.99 for the sum score, indicating excellent reliability scores (138). Only the first 11NRS set recording present status was included in Paper II, and the six-month follow-up questionnaire used in Paper III. The measure was named 11NRS in Paper I, but in the current thesis, the measure is referred to as "PainFunction," as named in Papers II-III. The questionnaire can be found in the Appendix.

Number of pain sites, NPS (Papers II-III):

A visual pain measurement was included as an additional pain assessment. Patients reported their pain distribution for the previous 14 days on a schematic-grid covered drawing of the front and back of the body, and the number of marked pain sites on the drawing was recorded, in accordance with Kameleri et al. (142).

Emotional distress, HSCL-10 (Papers II-III):

The Hopkins Symptom Checklist-10 (HSCL-10) is a ten-item measurement scored on a four-category Likert scale screening for emotional distress (143). HSCL-10 is tested in a Norwegian population, and a Cronbach's alpha of 0.88 is demonstrated (144), which is considered a reliable score (137). In the Norwegian population, a mean value higher than the suggested cut-off score of 1.85 suggests elevated emotional distress (144).

6.4 Statistical analyses

Papers I-III:
For all papers, descriptive data was presented with proportions and percentages (categorical variables), and with mean values and standard deviations (continuous variables). The level of statistical significance was set to 0.05 for all statistical analyses (145). All statistical analyses were performed using SPSS, initially with version 19.0 and lastly with version 22.0 (IBM Corp. Statistics for Macintosh, Armonk, NY, USA).

Independent-sample t-tests and chi-squared tests were applied for comparisons of included and excluded patients (Papers II-III), as well as for comparison between patient groups (Paper II) and variations among expectations and demographic characteristics (Paper I). In Paper III, dependent-sample t-tests were used for comparison of baseline and six-months follow-up scores (145, 146).

Sample size

Paper I:
Eligible patients were randomly selected during a six-month predefined time schedule.

Papers II-III:
The sample size was based on the estimation of a medium-effect regression models, as described by Green (147, 148), with the formula N > 104 + k (number of

independent variables), resulting in a minimum of 118 included patients. However, additional participants were included to account for losses during the planned six-month follow-up, and for supplementary prediction analyses. As a general guideline, at least 10 subjects per independent variable are required in linear regression models to avoid spurious results due to overfitting (145). Additional subjects are beneficial because of increased power (148).

Intraclass correlation coefficient (ICC) (Paper I):

The reliability of the Norwegian version of PSOE and PainFunction were assessed with one-way intraclass correlation coefficients (ICC), measuring the degree of correlation and agreement between measurements (138). One-way random approach was utilized. Scores > 0.75 and 0.9 indicate good and excellent reliability, respectively, whereas < 0.5 and 0.75 indicate poor or moderate results, respectively (138).

3 x 3 tables and test for marginal homogeneity (Papers II-III):

In Paper II, patients' expectations (PSOE) before and after the PMR consultation were categorized as "Better," "Unchanged" or "Worse" and cross-classified in a 3 x 3 contingency table. In Paper III, the differences in pain and functional status (PainFunction) between baseline and six months and patients' expectations (PainFunction), were categorized as "Better," "Unchanged" or "Worse" and cross-classified in a 3 x 3 contingency table. In both papers, the Stuart test for marginal homogeneity was used to compare the distributions of patients within each category ("better," "unchanged" and "worse") between the two time points (149). A significant p-value for the marginal homogeneity test indicates that a substantial shift of category have occurred from the first to the last time point (149).

Multiple linear regression models (Papers II-III):

In preparation, all variables were checked for deviations from normality, non-linear effects, multicollinearity and homoscedasticity. Thereafter, univariable analyses were performed for each of the independent variables. Multivariable linear regression

models were then conducted (145). In Paper II, a multivariable linear regression model was used to assess the relationship between the changes in expectations (PSOE) before and after the PMR consultation (dependent variable) and the independent variables described in the "demographic and individual characteristic" section, adjusted for the expectations (PSOE) before the consultation. The adjustment for the baseline expectation was conducted to account for possible regression to the mean (150). In Paper III, a multivariable linear regression model was used to assess the relationship between changes in PainFunction from baseline to six months (dependent variable) and the independent variables described in the "demographic and individual characteristic" section, adjusted for PainFunction at baseline. In all the multivariable models, all the independent variables were included simultaneously in the model.

6.5 Ethical aspects

The three studies were conducted in accordance with the Helsinki Declaration (151). Eligible patients received verbal and written information concerning the study prior to inclusion, including information about their participation being voluntary and not affecting the upcoming health care process. All patients provided written consent prior to participating.

The study was approved by the Data Protection Office at Oslo University Hospital (OUH) (2012/2574). ISRCTN registration was performed retrospectively (40963362).

7 Summary of Main Results

Paper I

This cross-sectional study assessed expectations for pain and functional outcomes prior to a PMR consultation among 107 patients with persistent neck and back complaints (52% females, mean age 49.7 years).

Expectations were measured by Patient Shoulder Outcome Expectancies (PSOE) translated to Norwegian, and an 11-point NRS-based measurement (PainFunction) that were constructed with the intent of a quantitative comparison between current and expected status.

Results of the PSOE showed that approximately 41% of the patients expected their pain and functional status to improve, 42% expected their status to remain unchanged and 17% expected their status to exacerbate. When measured with PainFunction, the mean difference between current and expected status indicated a tendency of expected improvement in pain and function (mean expected reduction 0.7, SD 1.6). However, all changes were below the predefined minimal clinically significant difference of 2 points. Patients with lower education ($p = 0.04$) and those reporting higher usage of analgesics ($p = 0.04$) had more optimistic expectations for improvement.

This paper presents that the majority of PMR patients with persistent neck and back complaints expected their pain and functional status to either remain unchanged or slightly improve. Only patients with lower education levels and higher analgesics usage differed from the remaining population by having higher expectations for improvement.

Paper II

Patients' expectations regarding pain and functional improvement and variations in demographic factors, including diagnoses, were compared before and after a PMR

consultation. The study sample consisted of 257 patients (51% females, mean age 49.4 years) with persistent neck/back (n = 165) or shoulder (n = 92) complaints.

Patients with neck/back complaints differed from patients with shoulder complaints on four variables: greater use of analgesics ($p = 0.009$), lower education level ($p = 0.014$), greater number of pain sites (NPS) ($p < 0.001$) and higher HSCL-10 score ($p = 0.003$). Overall, the patients' outcome expectations were more optimistic after the consultation compared with before the consultation. Approximately 24% expected a more positive outcome after the consultation, whereas 10% of the subjects exhibited a negative change in their expectations. Patients on sick leave ($p = 0.028$) and patients with shoulder complaints ($p = 0.022$) reported more positive expectations after the consultation than the remaining population.

This paper suggests that patients' expectations can be influenced by a single specialist consultation. Patients with shoulder complaints seemed to be more optimistic than patients with neck/back complaints.

Paper III

This prospective cohort study assessed whether patients' pain and functional expectations influence improvements in pain and functional status six months after a PMR consultation among 181 patients (51% females, mean age 51.2 years) with neck/back (n = 112) or shoulder (n = 69) complaints.

Pain and functional status improved from the PMR consultation (baseline) to six months (mean 1.1 (SD 1.9), $p < 0.001$). Patients' expectations partially aligned with their reported six-month status. However, the expected mean score at baseline (3.6 (SD 2.6)) was overall more optimistic (lower) than the reported score at six months (4.2 (SD 2.3)). Overall, approximately 40% of the patients expected an improvement at baseline, whereas 29% reported an improvement at six months, reflected by an improvement of a minimum of two points in PainFunction. Significantly less pain and functional improvement after six months was found in patients on sick leave ($p = 0.046$) and those reporting an increased number of pain sites ($p = 0.004$). However,

patients' expectations did not significantly influence improvement in pain and functional status at six months.

To conclude, patients' expectations did not significantly influence pain and functional improvement after six months in this study. Although a proportion of the patients' expectations did appear to align with their reported outcomes at six months, certain patients' expectations were more optimistic than their actual pain and functional improvement.

8 Discussion

8.1 Methodological considerations

8.1.1 Design

A cross-sectional design is applied in Papers I-II. In Paper II, the influence of a PMR consultation on expectations was assessed; hence, expectations were measured before and after the PMR consultation. The time delay between these measurements was approximately one hour. Measurements so closely related in time may be flawed by the patient remembering their scores and therefore may not be truly independent. However, other factors not related to the PMR consultation could have interfered with the assessment if the period between the first and the second measurements was increased. Thus, this choice of timing was considered necessary.

The study described in Paper III was a prospective cohort design. The prospective design prevents recall bias (152) but is prone to losses during follow-up (153, 154), as discussed below. Prospective cohorts are suitable for causality assessments, yet such assumptions require caution regarding confounding factors (152, 153). Expectation is a broad expression with a quite unprecise nature, and since it is a subjective assessment (10, 33), patients, health care providers and researchers could interpret the term differently (134). Expectations are a complex phenomenon and could possibly relate to other factors, such as personality traits, self-efficacy, illness beliefs and other health domains that may interfere or overlap with expectations (12) (discussed below), creating a risk for confounding bias. Thus, causal conclusions cannot be drawn from the present studies.

8.1.1 Patient population and setting

In the present studies, mainly Norwegian speaking/understanding and consenting adults with neck, back and shoulder complaints were included. Hence, a strength of the studies is a population that includes a wide specter of patients with well-defined areas of pain. However, literature suggests expectations could differ with increased

age (32) and across nationalities (125); hence, the present results may not be cross-culturally applicable, nor relevant for children or elderly patients (155). Additionally, the requirement of written consent prior to inclusion may create selection bias between consenting and non-consenting participants (156); yet, there were few non-consenting patients (n = 5).

The PMR outpatient clinic setting may have influenced the results. Several physicians conducted the consultations, and the content of the appointment and the following treatment strategies was not predefined nor recorded. This a wide approach including several variable elements may be considered limiting, challenging the interpretation of the results. However, the aim was an overall assessment of outcome expectations and their changes; thus, the study design may be viewed as a strength regarding generalization.

8.1.2 Missing and lost to follow-up

Only participants with completed questionnaires were included in Papers II-III. The proportion of eligible but not included subjects was therefore high. Less strict requirements could have increased the number of participants, but the following increased amount of missing data could have challenged the power of the analyses (157). Of all the implemented assessments, only HSCL-10 provides a missing data strategy (143). Similar techniques could have been applied to the remaining measures to increase the amount of participants, or more sophisticated approaches towards missing data in the analyses stage should perhaps have been considered (158).

Furthermore, 29% of the patients in Paper III were lost during the six-month follow-up. Losses during follow-up is common in cohort studies and results in missing data (154). The acceptable amount of losses during follow-up range from 40% to above 80%, depending on the assumptions of the missing data mechanisms (154). Patterns of loss during follow-up are frequently categorized as missing completely at random (MCAR) (losses have no association with exposure, cofounders or outcome), missing at random (MAR) (losses could have association with exposure or cofounders, but not outcome) and missing not at random (MNAR) (losses depend on the outcome) (159). In Paper III, those lost during the follow-up are likely MAR due to the younger age of

the lost participants. However, MCAR or MAR losses are considered ignorable and no important biases is demonstrated up to 60% losses (154).

8.1.3 Assessments

Expectation measurements

PSOE

PSOE was applied as general assessment of patients' expectations. O'Malley et al. created the measure in 2004 (21), and its construct validity and reliability were documented to be adequate (137).

In the present study, we conducted a forward and backward translation with a subsequent reliability testing in a sample of seven patients for the Norwegian version of PSOE and PainFunctions. One may argue that seven patients is a low number (160), and that the distraction time between the two tests was short (same day) opening for recall bias (161). However, given the rather scarce and unambiguous text and formulation in the questionnaires, very different reliability compared with the original English version was not expected. The questionnaire (both PSOE and PainFunction) was reported to be comprehensible by the patients.

One of the seven categories ("a little better") in the original PSOE was erroneously omitted in the preparation process; hence, the measurement utilized in Papers I-II was skewed to the left with only six categories, one more negative than positive. Nevertheless, the expectations were classified as "better," "unchanged" and "worse" for the analysis assuming marginal influence on the present results caused by the missing category. Furthermore, the results in Paper III revealed that the patients tended to have higher expectations than their actual improvement, supporting valid results despite this error. The measure was equal in Papers I-II, and the score was not compared with any other PSOE scores.

PainFunction

The PainFunction measurement was developed with the intention of a quantified comparison between patients' pain and functional present and expected status. No measure was found for comparison in order to evaluate content validity (162). However, the instrument is merely an adaptation of the 11NRS measurement of pain and function, which is well established and used worldwide in clinical settings and research (139). Furthermore, the ICC analyses indicated acceptable reliability scores (138).

Measuring expectations

For the PainFunction measure, a difference of two or more points on the 11NRS was interpreted to represent a clinically important difference based on the literature (140, 141). The same cut-off was used independent of high or low scores. However, in an arthritic pain study using visual analogue scale (VAS) scores, clinically important cut-offs differed depending on lower and higher scores (163). Different cut-offs depending on score level could possibly increase the sensitivity for changes. Furthermore, evidence for minimal clinical important differences regarding function measured on 11NRS was not found. Still, on other functional measurements, such as the Oswestry Disability Index (ODI) for low back pain (164), Neck Disability Index (NDI) (165) and Shoulder Pain and Disability Index (SPADI) (166), differences above 10%-20% are usually considered to be clinically significant. This would be equivalent to 1-2 points on the 11NRS; hence, two points could be a reasonable and conservative assumption. More intriguing, however, is the consideration of a clinically significant difference in measurements of patients' expectations. No recommendations for clinically significant changes in expectations were found, and no relevant external anchor in order to evaluate potential relevant cut-offs for expectations exists.

8.1.1 Statistics

Multiple linear regression models

Linear regression analyses were performed in Papers II-III after a thorough initial assessment of the assumptions (145). In these Papers, the independent variables (listed under "Demographic and individual characteristics") were selected according to established prognostic factors, and all variables were included simultaneously (forced entry) (145). The simultaneous approach was selected due to the lack of established knowledge concerning the priorities of the independent variables and their prognostic strength on patients' expectations, (145).

8.2 General discussion

8.2.1 Outcome expectations

Outcome expectations among patients with persistent neck, back and shoulder complaint were assessed in Paper I, and partly in Paper II. Approximately 41%-43% of the patients expected their pain and functional status to improve and 36%-42% expected their status to remain un-changed, whereas 17%-21% expected their pain and functional status to exacerbate.

Few studies have investigated patients' preliminary outcome expectations (32). Qualitative studies assessing contents of expectations exist (167, 168), but comparison of the present results and qualitative approaches are difficult. Additionally, for other quantitative studies, what is a "high" or "optimistic" expectation depends on the utilized scaling, which vary (24, 33). Nevertheless, some studies assessing patients' outcome expectations were located. Firstly, a review of return to work expectations in a non-specific, non-chronic low back pain populations revealed that high recovery expectations were more common than low expectations in the majority of the included studies (n = 10) (24). Secondly, high outcome expectations were presented among acute low back pain patients randomized to

traditional back pain care or traditional care plus alternative medicine interventions (acupuncture, chiropractic or massage) and approximately 86% had high/very high expectations for complete recovery (19). Thirdly, both low back and neck pain patients (no serious pathology, unspecified duration) had high outcome expectations towards exercise and manual therapy combinations, as approximately 60%-90% expected improvements (20, 169). Fewer studies have assessed shoulder and neck pain patients' expectations, but among acute whiplash patients, 66% expected to improve slowly or sooner and only 2% expected to never improve (170). In a mixed-shoulder population (67% chronic complaints), 62% of patients expected improvements. However, 16% underwent surgery during the study period (21). A further brief review of pre-surgical expectation literature revealed that low back (171, 172), neck pain (173, 174) and shoulder pain (175, 176) patients expected both pain and function to improve prior to surgery.

In sum, these studies (19-21, 24, 169-176) indicate that patients with neck, back and shoulder complaints have quite optimistic outcome expectations since the majority seems to have high expectations for improvement. This is although seen across differently composed patient populations, and the study outcomes range from general outcomes (170) towards return to work (177), physical/manual therapies (19, 20, 169) to surgical interventions (21, 171-176) (comparability of expectation studies is discussed below). In Papers I-II, the patients seem somewhat more modest in their expectations since close to half of the population (40%) expects their status to remain unchanged, and additionally 20% expect their status to exacerbate. In one other study, moderate expectations for improvement was found (16), yet this study assessed both fibromyalgia and chronic low back pain patients' expectations regarding cognitive interventions (16). Nevertheless, the reduced optimism could have several causes, but presumably, the duration of the patients' complaints is relevant. The included patients in Papers I-II were suffering from more or less persistent complaints, whereas the aforementioned studies (19-21, 24, 169-176) mostly assessed complaints of shorter durations. It is likely that outcome expectations are reduced over time, presumably do prolonged courses reduce expectations for recovery. Many patients have undergone several examinations, investigations and treatments with limited improvements; thus, the lack of positive results over time could be frustrating and challenge optimistic attitudes (16, 131). However, the exact duration of the complaint was insufficiently

recorded in Papers I-II, whereas an expectation study controlling for the length of complaints would have enlightened this.

It is intriguing that close to half of the patients in Papers I-II attended their specialist appointment when they expected their status to remain unchanged. Is this a lack of faith towards the upcoming health care and their opportunities and results? Or, is an "un-changed" expectation for certain patients actually optimistic if these patients sought health care to avoid further exacerbation? Optimistic or not, the concept of a "proper" or "correct" expectation is thought provoking. What an attending patient actually should expect is uncertain, as few chronic neck, back and shoulder diagnoses have pre-determined prognoses, and individual variation occurs in all medical conditions. As mentioned previously, expectations are individual (31) and therefore two persons suffering from similar conditions do not necessary have similar expectations.

8.2.2 Comparability of patients' expectations

The comparability between the expectations presented in Papers I-II and the other studies assessing patients' expectations (19-21, 24, 169-176) needs consideration. It is uncertain whether expectations are comparable between different groups of patients, interventions, or when expectations are even equally measured. Firstly, comparing patient groups, patients with neck/back complaints diverged from patients with shoulder complaints in Paper II by having greater analgesics usage, less education, greater number of pain sites and higher HSCL-10 scores. The shoulder patients were also expecting more pain and functional improvement. Differences in the expectations between diagnoses are also presented in a surgical population; patients undergoing hip surgery were more optimistic regarding the outcome than knee surgery patients (178). Secondly, it is likely that expectations towards different interventions vary. For instance, patients with non-specific low back pain attending GPs had lower outcome expectations compared with similar patients attending chiropractors (13). Comparing surgical and conservative intervention, a study assessing patients with intervertebral disc herniation found that the patients who preferred surgery differed in age, education, levels of disability and duration of symptoms compared with those not preferring surgery (179). Similarly, rheumatoid arthritis (RA) patients assessed for

hand surgery had higher expectations regarding function, work and pain compared with patients not preferring surgery (180). Despite the sparse literature foundation, these outlined differences could indicate that there are variations in expectations among groups of patients and between expectations towards unequal interventions. Laverton et al. proposed in their review that expectations are disease- and treatment-specific (10). Lastly, comparability of expectation between studies should also be questioned when expectations are unequally measured, which is an overall tendency within musculoskeletal expectation research (33). It is likely that general outcome expectations differ from expectations specified towards work return, physiotherapy/exercise programs, specified investigations, interventions or other defined outcomes. Several authors have proposed that expectations towards the treatment processes should be different from general outcome expectations approaches (32, 134). Hence, higher precision in future expectation studies' design and measurement tools is required for improved comparability among studies (33).

8.2.3 Changes in expectations

In Paper II, changes of expectations before and after a PMR appointment were assessed. To our knowledge, this is the first study assessing changes in expectations related to a PMR consultation. Approximately one-third of the patients changed their expectations during the consultation; thus, expectations were considered malleable. However, it is uncertain within whom these changes occurred. It was additionally not assessed why these changes in expectations took place or if they were appropriate. Most likely, the PMR appointment were related to the changes in the expectations, but the content of the consultations was not standardized between the physicians or recorded. This design provides a general insight into the character of the patients' expectations, suggesting them to be a dynamic factor. However, further understanding of physicians' influence and their ability to change patients' expectations requires more precise documentation of the conversations that occur during appointments. This would be especially beneficial for studies suggesting that physicians can attempt to change patients' expectations as a clinical intervention to improve outcomes (13, 31).

8.2.4 Expectations' variations among demographic and individual characteristics

Variations among patients' characteristics and expectations were assessed in Paper I, whereas Paper II assessed variations among changes in expectation. Firstly, those reporting higher analgesic's use had higher expectations in Paper I, possibly indicating greater beliefs in medical interventions (pharmacological or interventional). Or, perhaps well-medicated patients are less influenced by pain, and better suited for training interventions, ultimately raising expectations. However, no studies were found for comparison. Secondly, patients with lower education levels had more optimistic expectations. In contrast, lower return to work expectations were seen in patients with less education in a whiplash population (126). Possibly, this difference in expectations association to education level could be related to the different patient complaints (whiplash versus neck/back disorders) or content of the expectations (work-return versus general expectations). It could also be coincidental findings. The literature assessing the relation between education level and patients' expectations is overall limited.

For comparison with Paper I (for this thesis only), variations among outcome expectations and education level and analgesics use within the population in Paper II were assessed (expectations were equally measured before the PMR consultation with PSOE in both papers). In the population in Paper II, no differences between expectations and levels of education ($p = 0.811$) and analgesics use ($p = 0.275$) were revealed. However, patients with shoulder complaints were included in Paper II. As mentioned, when compared with patients with neck/back complaints, the shoulder patients were found to deviate on several individual factors including analgesics usage and education level. Hence, the inconsequent association between expectations and education level and analgesic usage in Papers I-II could be caused by the unequal patient populations, supporting the emphasized challenge of comparing expectation studies.

Considering changes of expectations before and after the PMR appointment and variations among patients' characteristics in Paper II, shoulder patients (discussed

above) and patients on sick leave were more positive in their expectations after the consultation compared with before. As mentioned, no comparable studies were located. However, the association between general outcome expectations and return to work is previously assessed in low back pain patients; a review presented work return expectations to be strongly associated with outcomes in regard of work return (24). However, Papers I-II assessed sick leave (yes/no) as a predictor for pain and functional outcomes; thus, the review (24) and Paper II had dissimilar designs. Still, the sick leave association in Paper II combined with the work expectations results in the review (24) could signalize that occupational factors are related to patients' outcome expectations at some degree.

Papers I-II did not find any association between expectations and other patient characteristics presented by literature (age (32), gender (127, 128), nationality (125), civil conditions (124), emotional distress (124) and depressive symptoms (126)). Similarly, a review considering expectations among cardiology and GP patients did not support any other associations than lower expectations seen with increased age (32). Hence, the literature foundation assessing expectations relations to patient' characteristics is by now inconsistent, possibly related to variable methodology among the different studies, as discussed. Meta-analysis and systematic reviews are gold standard in establishing evidence in observational studies (181), whereas the suggested associations all are presented in single studies. Therefore, potential variations in expectations within subgroups of patients should be more systematically investigated. Certain subgroups of patients should perhaps receive special attention regarding their expectations if actual and clinically relevant differences in expectations between different groups of patients or their characteristics are revealed.

8.2.5 Patients' expectations relation to outcome

Literature has proposed musculoskeletal patients' expectations to relate to treatment outcome; for acute low back pain patients, outcome expectations were associated with outcomes in patients attending medical back pain care combined with chiropractic and/or manual therapies (12, 13, 19) and in a pharmacological intervention study (14). Similarly, in chronic low back pain patients, associations between expectations and outcome were demonstrated in patients attending cognitive behavioral therapies

and/or physical therapies (15, 16). For neck patients, outcome expectations prior physiotherapy were shown to influence pain and, to some degree, disability improvements (17, 20). In an assorted shoulder pain population, outcome expectations were associated with improvements in function (21).

Nevertheless, patients' pain and functional expectations were not associated with improvement after six months in Paper III. Similar lack of association between expectations and outcome are presented elsewhere; for instance, no association between expectations and outcomes were demonstrated in acute low back pain patients attending physiotherapy (25) and acupuncture (26). Further, within chronic low back patients attending physio therapy (29) and a pharmacological and cognitive behavioral intervention (27), no association between expectations and outcomes were demonstrated. Lastly, expectations were not found to influence outcomes in a shoulder manipulation intervention (28).

This disagreement between the literature supporting (12-17, 19-21) and not supporting (25-29) the association between patients' expectations to outcome could have several causes. Firstly, it could be decisive that all the studies assessed expectations with variable expectation measures in different study designs involving different interventions (e.g., physiotherapy, chiropractors, cognitive behavioral approaches or unspecified health care), as discussed above. However, if the difference is not methodological, perhaps the varying evidence for the expectation outcome relation signifies that patients' outcomes are less dependent on expectations than formerly suggested. Kongsted et al. assessed acute low back pain patients' expectations relation to outcomes and hypothesized that the expectation outcome relation is a complex process that possibly relies on more than expectations (12). Other authors have also considered whether expectations only explain parts of the outcome relation, and that other related factors, such as personality traits and self-efficacy confounds the relation. The expectation term is broad and it is likely that other terms overlap (12, 153, 182). Future expectation studies should include other factors such as self-efficacy and motivation in attempts to better explain the association between patient expectations and treatment outcomes.

8.2.6 Expectations and patient communication

In Paper III, parts of the populations' expectations were aligned with the reported status at six months. However, for portions of the population, pain and functional status was not as expected. Overall, the mean expected score was more optimistic than the actual reported status six months later. Kongsted et al. presented similar tendencies within acute low back pain patients attending GPs or chiropractors; certain patients had expectations that were too high or low, yet the majority reported realistic expectations (12).

Unrealistic expectations may have negative impact on health care processes and outcome (16, 25). However, the expectations in Paper III may not be considered unrealistic, as the difference between the expected and reported status was small and did not meet the predetermined cut-off for clinical significant differences. Nevertheless, patients' expectations might not be clear for the physician unless they are explicitly addressed, and unrealistic expectations could be difficult to discover (183). Literature encourages clinicians to specifically address patients' expectations (134) and promote reasonable expectations for outcome if necessary (9, 131).

A communication model aimed at improving clinician's communication with patients with emotional distress highlights incorporation of expectations for better understanding of the patients' values and preferences, and promote a better intervention process (184). Generally, patient-centered care, or health care that is based on the needs and preferences of the patients, includes a clear and open communication channel comprising shared decision-making between the patient and the physician (85, 185). Both patient-centered care and shared decision-making approaches advise clinicians to involve patients' expectations in their patient communication (85, 132).

9 Conclusions and Further Perspectives

Regarding pain and functional expectations among patients with persistent neck, back and shoulder complaints, the conclusion of the present thesis are as follows:

- Patient Shoulder Outcome Expectancies (PSOE) and (PainFunction) was applicable expectation measures and revealed that prior to their first PMR appointment, close to half (40%) of the population expected their pain and functional status to remain unchanged.
- Expectations were considered malleable, as approximately one-third of the patients changed their expectations during a PMR appointment.
- Compared with patients with neck and back complaints, patients with shoulder complaints had more optimistic expectations regarding pain and functional improvement before their PMR consultation and they changed more frequently in a positive direction during the consultation.
- Patients' expectations were weakly and less consequently associated with patients' demographic and individual characteristics.
- Patients' pain and functional expectations were not found to influence pain and functional improvement six months later. However, patients' expectations partly aligned with their reported pain and functional status at six months.

The present thesis unfolds several needs for further research. As emphasized, there is a lack of expectations studies overall for patients with persistent back, neck and shoulder complaints in particular. More research is needed for further understanding of the clinical value and possible clinical application of patients' expectations.

- For future improved research quality, there is a documented need for standardization, common interpretation and definition of patients' expectations, as well as consensus of proper measurement methods and tools. The PainFunction measure would benefit from external validation and testing in other studies.
- Until more research exists, caution should be made when comparing patients' expectations across different groups of patients, dissimilar interventions and expectations that are unequally measured.
- Few traditional demographic and individual characteristics were associated with expectations in the included studies; therefore, more research is required for understanding if and how expectations differ among patients, and also what factors patients base their expectations on.
- The suggested association between expectations and outcome were not supported in this thesis, although documented elsewhere. Additional research, in particular longitudinal studies, is required for clarification. Such studies would also enable further understanding of the evolvement of expectations over time.
- The complexity of expectations is emphasized and factors that have been suggested to relate to expectations, such as self-efficacy, motivation and other personality traits should be further assessed.
- Literature proposes that patients' expectations are important in clinical communication; yet, more detailed research that assesses the content of conversations and possible alteration of expectations is needed to enlighten clinicians' approaches towards patients' expectations.

10 Erratum

Regarding Paper I, "Expectations for treatment outcomes in neck/back patients regarding improvements in pain and function: A cross-sectional pilot study (1):

The second sentence in the result section is incorrect.

Incorrect: Patients with more education (>4 years of higher education) had greater expectations for improvement compared to patients with minimal education (<10 years in total) (p = 0.04, presented in Table I).

Corrected: Patients with low education (<13 years) had greater expectations for improvement compared to patients with higher education levels (>13 years) (p = 0.04, presented in Table I).

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12 Appendix

12.1 Classification of diagnoses

Classification of neck/back diagnoses

ICD-10	**1. Specific**
	Neurogenic
	Other pathology (inflammation, cancer, trauma +)
40.0-.9	Deforming back conditions
41.0-.9	Scoliosis
42.0-.9	Spinal osteochondrosis
43.0-.9	Other deforming dorsopathies
45.0-.9	Ankylosing spondylitis
46.0-.9	Inflammatory conditions
47.0-9	Spondylosis
48.0-.9	Other spondylopathies
49.0-.9	Spondylopathies in diseases classified elsewhere
50.0-.9	Cervical disk disorder
51.0-.9	Other intervertebral disc disorder
53.9	Dorsopathy, unspecified
54.0	Panniculitis affecting regions of neck and back
XIX	Injury, poisoning and other consequences of external causes
	2. Unspecific
	Unspecific back-pain
48.8	Other specified spondylopathies
50.9	Cervical disc disorder, unspecified
51.9	Intervertebral disc disorder, unspecified
53.0	Cervicocranial syndrome
53.1	Cervicobrachial syndrome
53.2	Spinal instabilities
53.3	Sacrococcygeal disorders, not elsewhere classified
53.8	Other specified dorsopathies
54.1	Radiculopathy
54.2	Cervicalgia
54.3	Sciatica
54.4	Lumbago with sciatica
54.5	Low back pain
54.6	Pain in thoracic spine
54.8	Other dorsalgia
54.9	Dorsalgia, unspecified
25.5	Pain in joint
79.1	Myalgia

Comments: Specific - unspecific neck/back diagnoses:
- There is a code .9 in many chapters, which are considered specific. These diagnoses have a defined origin, since they are ordered in a chapter-
- “Diseases classified elsewhere" are considered the same way.
- In cases of doubt where the patient journal evaluated.

Source: www.formi.no

Classification of shoulder diagnoses

ICD-10	Group 1
	SUBACROMIAL CONDITIONS
75	*Shoulder lesions*
75.1	Rotator cuff syndrome
75.2	Bicipital tendinitis
75.3	Calcific tendinitis of shoulder
75.4	Impingement syndrome of shoulder
75.5	Bursitis of shoulder
	Group 2
	ADHESIV CAPSULITIS
75.0	Adhesive capsulitis of shoulder
	Group 3
	DEGENERATIVITY/ARTROSIS
15-19	Arthrosis
15.0-.9	Polyarthrosis
19.0-.9	Other arthrosis
	Group 4
	OTHER CONDITIONS
0-3	***Infectious arthropathies***
00.0-.9	Pyogenic arthritis
01.0-.9	Direct inf. of joint in inf./parasitic dis. clas. els.
02.0-.9	Reactive arthropathies
03.0-.9	Postinfective and reactive
0.5-14	***Inflammatory polyarthropathies***
0.5-.9	Seropositive rheumatoid arthritis
0.6-.9	Other rheumatoid arthritis
0.7-.9	Psoriatic and enteropathicarthropathies
0.8-.9	Juvenile rheumatoid arthritis
10.0-.9	Gout
11.0-.9	Other crystal arthropathies
12.0-.9	Other specific arthropathies
13.0-.9	Other arthritis
14.0-.9	Arthropathies in other diseases clas. els.
20-25	***Other joint disorders***
30-36	***Systemic connective tissue disorders***
30.0-.9	Polyarteritis nodosa
31.0-.9	Other necrotizing vasculopathies
32.0-.9	Systemic lupus erythematosus
33.0-.9	Dermatopolymyositis
34.0-.9	Systemic sclerosis
35.0-.9	Other systemic involvement of connective tissue

36.0-.9	Systemic connective tissue in dis. clas. els.
60-79	***Soft tissue disorders***
60-63	***Disorders of muscles***
60.0-.9	Myositis
61.0-.9	Calcification and ossification of muscle
62.0-.9	Other disorders of muscle
63.0-.9	Disorders of muscle in diseases clas. els.
65-68	***Disorders of synovium and tendon***
65.0-.9	Synovitis and tenosynovitis
66.0-.9	Spontaneous rupture of synovium and tendon
67.0-.9	Other disorders of synovium and tendon
70-79	***Other soft tissue disorders***
70.0-.9	Soft tissue disorders related to use, overuse
71.0-.9	Other bursopathies
72.0-.9	Fibroblastic disorders
73.0-.9	Soft tissue disorders indiseases clas. els.
75.8	Other shoulder lesions
75.9	Shoulder lesion, unspecified
79.0	Other soft tissue disorders, not els. clas.
80-84	***Osteopathies***
80.0-83.9	Osteoporosis with pathological fracture
84.0	Malunion of fracture
85.0	Fibrous dysplasia
86-90	*Other boneconditions*
86.0-.9	Osteomyelitis
87.0-.9	Osteonecrosis
88.0-.9	Paget's disease of bone
89.0-.9	Algoneurodystrophy
90.0-.9	Osteopathies in diseases clas. els.
91-94	***Chondropathies***
93.0-94.9	Other osteochondropathies
95-99	***Other disorders of the MSS and connective tissue***
95.0-.9	Acquired deformities
96.0-.9	Pseudarthrosis after fusion or arthrodesis
99.0-.9	Biomechanical lesions, not clas. els.
XIX	Injury, poisoning and other consequences of external causes
S40-49	Injuries to the shoulder and upper arm

clas. els.: classified elsewhere
Source:
- Niels Gunnar Juel
- Cecilie Røe

12.2 Questionnaires

Paper I

YOUR EXPECTATIONS

PSOE

1. Compared with now, I think my **neck and/or back problem(s) overall** next month will be:

□ Much worse □ Worse □ A little worse □ The same □ Better □ Much better

2. Compared with now, I expect my **neck and/or back pain** next month will be:

□ Much worse □ Worse □ A little worse □ The same □ Better □ Much better

3. Compared with now, I expect my **ability to use and move my neck and/or back** next month will be

□ Much worse □ Worse □ A little worse □ The same □ Better □ Much better

Paper I

Oslo University Hospital

YOUR EXPECTATIONS

11-NRS

Describe your **neck and/or back problem(s)** as they are now:

4. **Pain at rest:**

No pain ☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 Worst pain imaginable

5. **Pain during activity** (all activities, including daily activities and exercise):

No pain ☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 Worst pain imaginable

6. Ability to **use as well as move your neck and/or back:**

No movement restrictions ☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 No movement possible

How do you expect your neck/back problem will be **after seeing a doctor**:

7. **Pain at rest:**

No pain ☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 Worst pain imaginable

8. **Pain during activity** (all activities, including daily activities and exercise):

No pain ☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 Worst pain imaginable

9. Ability to **use as well as move your neck and/or back:**

No movement restrictions ☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 No movement possible

From heron, all questionnaires exist in a shoulder and a neck/back version.

Paper II

Oslo University Hospital

YOUR EXPECTATIONS *(before the PMR appointment)*

PSOE

Compared with now, I think my **shoulder problem overall** next month will be:

□ Much worse □ Worse □ A little worse □ The same □ Better □ Much better

Compared with now, I expect my **shoulder pain** next month will be:

□ Much worse □ Worse □ A little worse □ The same □ Better □ Much better

Compared with now, I expect my **ability to use and move** my shoulder next month will be

□ Much worse □ Worse □ A little worse □ The same □ Better □ Much better

PainFunction

Describe your **neck and/or back problem(s)** as they are now:

Pain at rest:

No pain □ 0 □ 1 □ 2 □ 3 □ 4 □ 5 □ 6 □ 7 □ 8 □ 9 □ 10 Worst pain imaginable

Pain during activity (all activities, including daily activities and exercise):

No pain □ 0 □ 1 □ 2 □ 3 □ 4 □ 5 □ 6 □ 7 □ 8 □ 9 □ 10 Worst pain imaginable

Ability to **use as well as move your neck and/or back:**

No movement restrictions □ 0 □ 1 □ 2 □ 3 □ 4 □ 5 □ 6 □ 7 □ 8 □ 9 □ 10 No movement possible

Paper II

Oslo University Hospital

YOUR EXPECTATIONS *(after the PMR appointment)*

PSOE

Compared with now, I think my **shoulder problem overall** next month will be:

□ Much worse □ Worse □ A little worse □ The same □ Better □ Much better

Compared with now, I expect my **shoulder pain** next month will be:

□ Much worse □ Worse □ A little worse □ The same □ Better □ Much better

Compared with now, I expect my **ability to use and move** my shoulder next month will be

□ Much worse □ Worse □ A little worse □ The same □ Better □ Much better

Paper III

Oslo University Hospital

YOUR EXPECTATIONS *(Baseline questionnaire)*

PainFunction

Describe your **neck and/or back problem(s)** as they are now:

Pain at rest:

No pain ☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 Worst pain imaginable

Pain during activity (all activities, including daily activities and exercise):

No pain ☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 Worst pain imaginable

Ability to **use as well as move your neck and/or back:**

No movement restrictions ☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 No movement possible

Here you should describe how you expect that your situation will be with regard to pain and (the ability to) function six months from now.

Expected **pain at rest** six months from now**:**

No pain ☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 Worst pain imaginable

Expected **pain during activity** six months from now (all activities, including daily activities and exercise):

No pain ☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 Worst pain imaginable

Expected ability to **use as well as move your neck and/or back** six months from now**:**

No movement restrictions ☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 No movement possible

Paper III

Oslo University Hospital

YOUR EXPECTATIONS *(Six month follow-up questionnaire)*

PainFunction

Describe your **neck and/or back problem(s)** as they are now:

Pain at rest:

No pain ☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 Worst pain imaginable

Pain during activity (all activities, including daily activities and exercise):

No pain ☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 Worst pain imaginable

Ability to **use as well as move your neck and/or back:**

No movement restrictions ☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 No movement possible

13 Papers I-III

Paper I

Expectations for treatment outcomes in neck/back patients regarding improvements in pain and function: A cross-sectional pilot study.
Sigrid Skatteboe, Cecilie Røe, Morten Wang Fagerland, Lars-Petter Granan.
Eur J Phys Rehabil Med. 2014;Vol. 50:649-56 (1).

Paper II

Expectations of pain and functioning in patients with musculoskeletal disorders: A cross-sectional study.
Sigrid Skatteboe, Cecilie Røe, Morten Wang Fagerland, Lars-Petter Granan.
BMC Musculoskelet Disord. 2017; 18(1):48 (2).

Paper III

The influence of expectations on improvement in pain and function in patients with neck/back/shoulder complaints: A cohort study.
Sigrid Skatteboe, Cecilie Røe, Morten Wang Fagerland, Lars-Petter Granan.
Eur J Phys Rehabil Med. 2017 (3)

II

Skatteboe *et al. BMC Musculoskeletal Disorders* (2017) 18:48
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BMC Musculoskeletal Disorders

RESEARCH ARTICLE Open Access

Expectations of pain and functioning in patients with musculoskeletal disorders: a cross-sectional study

Sigrid Skatteboe[1,2,5*], Cecilie Røe[1,2], Morten Wang Fagerland[3] and Lars-Petter Granan[1,4]

Abstract

Background: Research has suggested that patient expectations are associated with treatment outcome and evolve along with patient communication within the musculoskeletal field. However, few studies have investigated if or how physical medicine and rehabilitation (PMR) consultations affect the attending patients' expectations regarding pain and functional improvement. Hence, the aims of the present study were to compare patient expectations regarding pain and functional improvement before and after a PMR consultation and to assess patient characteristics, including diagnosis, that could perhaps predict changes in expectations.

Methods: The study design was cross-sectional. Eligible participants were first-time patients with neck/back or shoulder complaints who were referred to a PMR outpatient clinic between January and June 2013. Questionnaires (the Patient Shoulder Outcome Expectancies, or PSOE, questionnaire and a numeric rating scale, or NRS) focused on expectations regarding pain and functioning were completed immediately prior to and after a consultation with a PMR specialist.

Results: In total, 257 patients were included. In total, 24% of the subjects expected a more positive outcome after the PMR consultation compared with before the consultation, while 10% of the subjects exhibited a negative change in expectations. Few patient characteristics other than sick leave were associated with changes in expectations; however, patients with shoulder complaints seemed to be more optimistic than patients with neck/back complaints.

Conclusion: Expectations can be influenced by a single specialist consultation. Among clinical prognostic factors, only sick leave influenced the change expectations. However, patients with shoulder complaints seemed to be more optimistic than patients with neck/back complaints.

Trial registration: The study was approved by the Data Protection Office at Oslo University Hospital, 2012/2574. ISRCTN registration: 40963362 (registered retrospectively 12.12.2016)

Keywords: Back pain, Neck pain, Shoulder pain, Musculoskeletal pain, Treatment outcome

Background

An expectation can be defined as "a person's subjective opinion about an outcome" [1]. From a medical perspective, many symptoms and diagnoses are often accompanied by expectations about the medical complaint, the subsequent treatment [2], and the prognosis and outcome [3]. Expectations are typically individual and heterogeneous. However, conceptualized categories such as socioeconomic background [4], previous health experiences [5], personality and emotional distress [6] and musculoskeletal pain [7] can affect expectations.

Patient expectations are notable for several reasons, but predominantly due to the suggested association with treatment outcomes [8]. This relationship is mainly observed within the musculoskeletal field in patients with low back pain [9], neck pain [10] and shoulder pain [8]. In a systematic review by Mondloch et al., positive treatment expectations were associated with improved health outcomes in 15 of 16 studies [11]. Unrealistic expectations, whether high or low, are suggested to negatively influence outcomes [12]. This concept has

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inspired hypotheses regarding clinical utilizations of expectations, e.g., as described by Mondloch et al. [11] and Myers et al. [13], suggesting that adjustments of negative, unrealistic and/or non-beneficial expectations [14] could improve outcomes [9]. However, few clinical trials have examined these hypotheses. Mancuso and coworkers [15] attempted to modify expectations in a randomized controlled trial (RCT), and their results suggested that expectations are adjustable. This trial was, however, a surgical trial, so the results may be less applicable to conservative approaches [16]. Additionally, in a systematic review of patient-physician relationships, ten of the 19 included studies demonstrated that positively enhancing patient expectations significantly improved health outcomes [17]. However, this review did not specifically target musculoskeletal patients or expectations specifically regarding pain and functioning.

Furthermore, patient expectations have been noted to be relevant in patient communication, especially in reducing misunderstanding [18], increasing satisfaction [19] and encouraging shared decision making [20]. Patients with musculoskeletal conditions with pain and functional complaints have been shown to require careful provision of information [21], and the inclusion of a discussion of expectations in clinical consultations could be useful for further improvement of patient communication and care. Health care professionals have been shown to have a strong influence on patient attitudes and beliefs [22], and it is likely that the dialog during a consultation can influence patient expectations. Finally, little is known about how expectations vary among different patient groups, and we were unable to find literature comparing different joint conditions within the musculoskeletal system in this context.

The aims of the present study were to compare expectations regarding pain and function before and after a consultation with a physical medicine and rehabilitation (PMR) physician and to assess whether changes in expectations varied among patients with neck/back or shoulder complaints, and/or were associated with patient characteristics.

Methods

This study had a cross-sectional design

Patients

The Norwegian health care system is run by the National Insurance Scheme (Folketrygden, or NIS), which covers all residents. Hence, patients are only charged portions of the total cost, as regulated by the government. There is also an upper limit to how much each patient can be charged every year, and the government covers costs beyond that limit. All citizens are assigned to a general practitioner (GP), which can be changed twice per year if the patient wishes. The GPs are responsible for referring patients to specialized care, often located in public hospitals. Oslo University Hospital (OUS) not only covers the capital area but also obtains regional assignments, resulting in coverage of 0.5 and 2.6 million inhabitants, respectively. The OUS PMR clinic consists of both an outpatient clinic and a hospital ward. The outpatient clinic receives patients with musculoskeletal complaints associated with pain/functional problems; clear surgical referrals are not accepted. Only patients > 15 years of age are permitted. Approximately 20 patients with neck/back and shoulder complaints visit the outpatient clinic daily.

The present study was based on information extracted from questionnaires completed by patients with neck/back and shoulder complaints at the PMR outpatient clinic. A sample of patients referred to the PMR outpatient clinic between January and June 2013 (18 weeks) were considered eligible for inclusion. The exclusion criteria were previous visits to the clinic, a lack of a neck/back/shoulder diagnosis and a lack of consent. An interpreter was utilized to help non-Norwegian-speaking patients to understand and complete the forms if the interpreter was pre-booked for the consultation. The first author was responsible for both including patients and administrating the forms regarding expectations. Not all potential eligible patients were included due to the logistic limitations of having only one administrative person involved.

Procedures

As part of the clinical routine, all primary attending patients at the PMR outpatient clinic received a general questionnaire by mail, together with the appointment letter. This questionnaire recorded general information (described below) and was filled prior to the consultation day. Patients eligible for the current study obtained a written letter providing information about the study and a consent letter on the day of the consultation. Consenting participants thereafter received two forms regarding expectations. One was completed immediately before the consultation, and the second was completed directly after the consultation (approximately 1 h later). These two forms considered the present status of pain and function and expectations regarding improvement in pain and function (described below and found in Additional file 1). The PMR physicians did not receive any instructions regarding the study.

Assessments

The primary outcome, namely, expectations, was measured using the Norwegian version of the Patient Shoulder Outcome Expectancies (PSOE) [8] questionnaire. This measure contains questions about expectations regarding the overall problem, the specific pain, and

one's ability to move one's shoulder/neck/back during the next month. The three questions are scored on a six-point numeric rating scale (NRS), ranging from one ("much worse") to six ("much better") [8]. Evidence for the unidimensionality of this measure was obtained from a confirmatory factor analysis in which one factor accounted for 89% of the item variance, and the internal consistency was calculated, with a Cronbach's alpha of 0.94 [8]. The modification of the original English-language, shoulder-problem related version of the questionnaire for use in Norwegian and in a neck/back problem population has previously been documented [23]. Expectations (PSOE) were measured both before and after the consultation.

Three 11-point NRSs (11NRS) were included to define the present status before the consultation. The scales recorded pain during rest, pain during activity, and physical functioning. The scales were scored between zero, indicating "no pain/no movement limitations," and ten, indicating "worst possible pain/no movement possible."

The general questionnaire sent to the patients prior to the consultation and returned on the day of the consultation included the following:

The Hopkins Symptom Checklist-10 (HSCL-10) [24] was included as a measurement of emotional distress. The HSCL-10 exhibits reliable sensitivity and specificity and has been tested in the Norwegian population [25]. A Cronbach's alpha of 0.88 has been demonstrated [25], which is considered a reliable score [26]. Each question has four response categories ("not at all," "a little," "quite a bit," and "extremely") and is scored from one to four. Missing values were replaced with the mean value of the other items if three or fewer items were missing. A mean score was not calculated for subjects with more than three missing values (n = 17). A mean value higher than the suggested cut-off score of 1.85 suggested elevated emotional distress [25].

The pain distribution for the previous 14 days was indicated schematically on a drawing of the body. The number of pain sites (NPS) on the drawing was recorded according to the protocol of Kamaleri et al. [27].

Demographic data included age and sex, language (Norwegian/other), marital status (married/partner/single), level of education (>13 years), sick leave due to neck/back/shoulder problems (yes/no), smoking (yes/no) and daily use of analgesics (yes/no). The number of days ("time of waiting") between referral and the PMR consultation was also recorded, as was the International Classification of Diseases, Tenth Edition (ICD-10) diagnosis selected by the physician (specific or not, with the classification provided in Additional file 2).

Statistics

Patient characteristics were compared between those completing all forms and the non-completers using independent-sample t-tests.

Expectations were scored according to the protocol of O'Malley et al. [8]: the scores on the three PSOE questions were summed, yielding a maximum total score of 18. A score of nine equaled an expectation of no change in status. Scores below nine indicated an expectation of aggravation of status, while scores above nine indicated an expectation of improvement. Changes in expectations were defined as the difference in PSOE values before and after the PMR consultation. This difference was classified as "unchanged" if expectations were identical before and after the consultation (difference score of zero). "Improved" implied that expectations regarding pain and functional status were more optimistic after the consultation compared with before (positive difference score). In contrast, "worse" indicated that expectations were more pessimistic after the consultation (negative difference score). A test for marginal homogeneity [28] was used to compare the distributions of the "improved," "unchanged" and "worse" classifications before and after the consultation. The null hypothesis was that the proportions of patients reporting "improved," "unchanged," and "worse" expectations were the same before and after the PMR consultation (marginal homogeneity). A p-value < 0.05 for the test of marginal homogeneity indicated a qualitative change in expectations, such as from "unchanged" to "improved." A mean value was calculated from the three 11NRS, from here on defined as "PainFunction."

Univariable and multivariable linear regression models were used to assess the relationship between the change in expectations (PSOE) from before to after the PMR consultation (dependent variable) and the independent variables, which included language, marital status, level of education, sick leave due to this problem, smoking, daily use of analgesics, the number of days between referral and the PMR consultation, and the ICD-10 diagnosis (variable categorization specified above). A joint-specific variable (shoulder versus neck/back problem) was also included as an independent variable. All variables were checked for deviations from normality, non-linear effects, multicollinearity and homoscedasticity. Firstly, univariable analyses were performed on each of the independent variables. Secondly, all independent variables were included in a multivariable model.

In addition to the regression analyses described above, the difference in expectations among patients with shoulder complaints compared with patients with neck/back complains was assessed using independent-sample t-tests.

The sample size was based on estimation for medium-effect regression models, as described by Green [29], with N > 104 + k (number of independent variables) = a minimum of 118 included patients, but additional participants were included for supplementary prediction analyses (shoulder versus neck/back complaints comparison) and to account for drop out during the planned 6-month follow-up. At least 15 subjects were included per independent variable in all regression models.

The level of statistical significance was set to 0.05 for both t-tests and regression models. All statistical analyses were performed using SPSS version 22.0 (IBM Corp. Statistics for Macintosh, Armonk, NY, USA).

Results

Five patients did not consent to participate and thus were not included in the study. In total, 343 patients were eligible for inclusion. Only 257 patients completed all questionnaires (the general questionnaire and the questionnaires both before and after the consultation). Hence, the analyses were performed on 257 patients, with 165 with neck/back complaints and 92 with shoulder complaints. An overview of the inclusion process can be found in the flow chart (Fig. 1). The non-included participants (patients with incomplete questionnaires (n = 78) and patients with a changed primary diagnosis (n = 8)) did not differ significantly from the included patients, except in terms of the time of waiting.

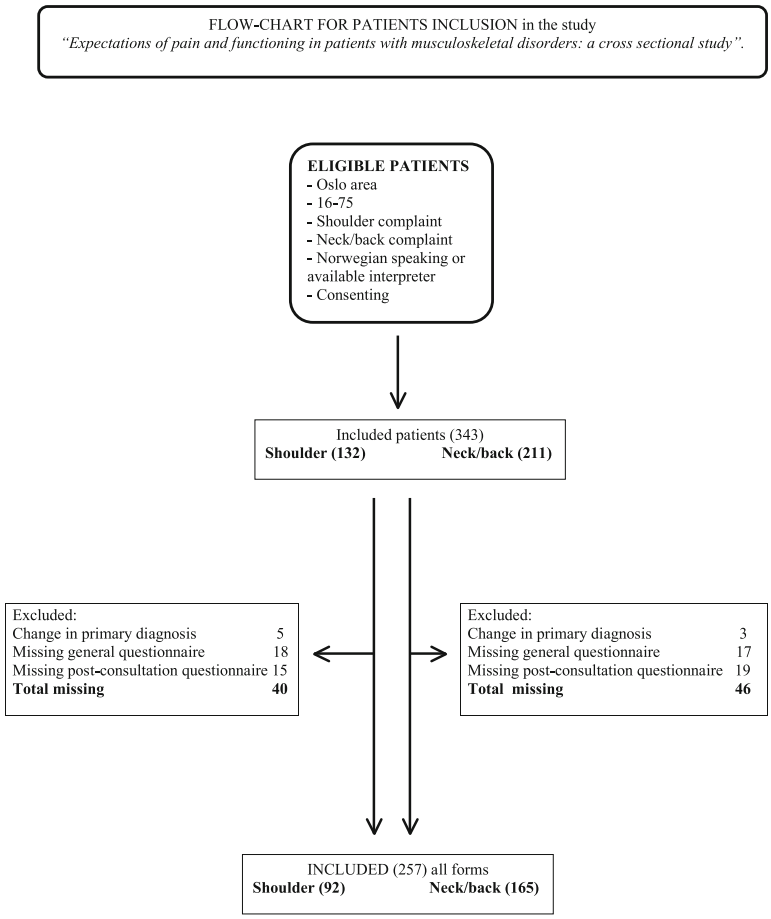

Fig. 1 FLOW-CHART FOR PATIENTS INCLUSION in the study. "Expectations of pain and functioning in patients with musculoskeletal disorders: a cross sectional study"

The remaining comparisons between completers and non-completers are found in Table 1. However, most of the non-completers did not fill out the general questionnaire, and hence, we did not have complete patient characteristics for this group. The mean age of the included patients was 49.4 years (SD 14.9), and 51.4% of the patients were females. Patients with neck/back complaints differed from patients with shoulder complaints on four variables: greater use of analgesics; less education; a greater NPS; and a higher HSCL-10 score (1.95), with a mean value above the cut-off value, in contrast to the patients with shoulder complaints (1.71). Finally, the patients with neck/back complaints seemed to be less optimistic after the consultation compared with the patients with shoulder complaints. All patient characteristics are presented in Table 1.

Changes in expectations

In total, 24% of patients had more positive expectations after the consultation, and 9% of patients had more negative expectations after the consultation, as measured by the PSOE (Table 2). A more positive shift was observed in the patients with shoulder complaints than in the patients with neck/back complaints.

Predictors of changes in expectations

Few patient characteristics predicted changes in expectations from before to after the consultation (Table 3). Only having a neck/back-related complaint compared with a shoulder-related complaint as well as sick leave and baseline expectations were statistically significant as predictors. The combined included variables described 44.2% of the total variance (R^2) in changes in expectations.

Discussion

One quarter of the patients changed their expectations in a positive direction after the consultation. This optimistic change was unexpected, considering the chronicity surrounding patients referred to specialist PMR

Table 1 Characteristics of patients with (257) and without (86) complete questionnaires

(n) % / Mean (SD)	Neck (*n* = 58)/back (*n* = 107)	Shoulder (*n* = 92)	p-value (1)	Total (*n* = 257)	Non-completing	p-value (2)
	(165) 64.2%	(92) 35.8%		257	86	
Sex (female)	(84) 50.9%	(48) 52.2%	0.949	(132) 51.4%	(44) 52.3%	0.462
Age	50.1 (15.6)	48.4 (13.2)	0.287	49.4 (14.9)	46.6 (12.9)	0.875
Smokers (daily)	(29) 18.0%	(20) 21.5%	0.609	(47) 19.0%	(12) 18.8%	0.971
Education (higher)	(47) 51.7%	(47) 50.6%	0.014**	(110) 43.8%	(39) 51.3%	0.298
Use of analgesics (daily)	(69) 44.2%	(19) 20.7%	0.009**	(88) 35.8%	(15) 21.4%	0.148
Sick leave (yes/no)	(72) 49.3%	(39) 44.8%	0.509	(111) 47.6%	(41) 48.2%	0.063
Language (Norwegian)	(132) 85.7%	(78) 86.7%	0.837	(210) 86.1%	(52) 69.3%	0.863
Marital status (married/partner/single)	(62) 67.4%	(63) 67.7%	0.486	(173) 70.0%	(53) 62.4%	0.452
Time of waiting (days)	69.6 (40.4)	65.8 (35.9)	0.454	68.2 (38.8)	82.3 (47.1)	0.014**
HSCL-10 > 1.85	(68) 50.0%	(33) 36.7%	0.003**	(101) 42.8%	(18) 41.9%	0.991
PSOE exp. before consultation	8.7 (3.3)	8.4 (3.2)	0.417	8.6 (3.2)	8.9 (3.3)	0.533
PSOE exp. after consultation	8.2 (2.7)	7.1 (2.4)	0.003**	7.7 (2.6)	7.9 (2.4)	0.788
Pain and function*[1]	5.4 (2.1)	5.1 (2.0)	0.300	5.3 (2.1)	5.1 (2.2)	0.586
Number of pain sites	4.0 (2.2)	3.0 (1.8)	0.000**	3.6 (2.1)	3.52 (3.4)	0.762
Back-specific diagnosis*[2]	(64) 59.8%					
Neck-specific diagnosis*[2]	(26) 44.8%					
Subacromial conditions*[2]		(26) 28.3%				
Adhesive capsulitis*[2]		(14) 15.2%				
Degeneration/arthrosis*[2]		(2) 2.2%				
Other shoulder conditions*[2]		(50) 54.3%				

(1) Comparing of the neck/back and shoulder population
(2) For comparing patients with and without complete questionnaires
HSCL Hopkins Symptom Checklist-10 (HSCL-10), cut-off of 1.85, *PSOE* Patient Shoulder Outcome Expectancies, *Exp.* expectations
**Significant at $p < 0.05$
*[1]PainFunction: mean 11NRS pain and functioning baseline scores
*[2]Diagnosis categorization in additional file 2

Table 2 Patient expectations regarding pain and functional status (PSOE) before (rows) and after (columns) the PMR consultation

All patients				
			Exp.[*1] after cons.[*2]	
Exp. [*1] before cons. [*2]	n (%)	Better	Unchanged	Worse
	Better	90 (35.0)	20 (7.8) [(w*3)]	1 (0.4) [(w*3)]
	Unchanged	31 (12.1) [(b*4)]	57 (22.2)	3 (1.2) [(w*3)]
	Worse	18 (7.0) [(b*4)]	12 (4.7) [(b*4)]	25 (9.7)
	No change: 66.9%, better: 23.9%, worse: 9.4%			
	$p < 0.0001$ (test for marginal homogeneity)			
Patients with neck/back complaints				
			Exp.[*1] after cons.[*2]	
Exp. [*1] before cons. [*2]	n (%)	Better	Unchanged	Worse
	Better	52 (31.5)	14 (8.5) [(w*3)]	1 (0.6) [(w*3)]
	Unchanged	17 (10.3) [(b*4)]	42 (25.5)	3 (1.8) [(w*3)]
	Worse	9 (5.5) [(b*4)]	8 (4.8) [(b*4)]	19 (11.5)
	No change: 69.1%, better: 20.6%, worse: 10.9%			
	$p < 0.0013$ (test for marginal homogeneity)			
Patients with shoulder complaints				
			Exp.[*1] after cons.[*2]	
Exp. [*1] before cons. [*2]	n (%)	Better	Unchanged	Worse
	Better	38 (41.3)	6 (6.5) [(w*3)]	0 [(w*3)]
	Unchanged	14 (15.2) [(b*4)]	15 (16.3)	0 [(w*3)]
	Worse	9 (9.8) [(b*4)]	4 (4.3) [(b*4)]	6 (6.5)
	No change: 64.1%, better: 29.3%, worse: 6.5%			
	$p < 0.0004$ (test for marginal homogeneity)			

[*1] *Exp.* expectations, [*2] *cons.* consultation, [*3] *w* worse, *b*[*4] better

clinics. Expectations should, in our opinion, be considered malleable. We were unable to find comparable literature regarding this alteration in patient expectations. However, if only pre-consultation expectations are considered, a study by Boonstra et al. [30] suggested that 61% of rehabilitation patients expected less pain and that 53% expected more activity prior to intervention, which are similar rates to those presented in our study.

In contrast, 10% of the patients in our study were more pessimistic regarding future pain and functional status after the first consultation. This negative alteration may have been due to clarification of an unrealistic prior expectation. Attending patients may have inappropriate insights into their own condition and present unrealistic assumptions for the upcoming process and prognosis. In 2008, Lurie et al. [2], for instance, found that the majority of patients with lumbar disk herniation preferred and expected surgery. It is likely that not only patients with lumbar disk pathology but also a variety of patients with neck/back or shoulder complaints do not expect or prefer a non-surgical approach. All unmet presumptions regarding treatment preferences, radiology, and physiotherapy/training interventions and other disagreements related to follow-up care may influence patient expectations. Furthermore, many patients are inadequately informed about their condition, regardless of the duration of their condition. The first PMR consultation may uncover unrealistic expectations based on imprecise insight. Unrealistic high or low expectations have been demonstrated to negatively influence treatment outcomes [12]. Despite this negative shift in 10% of the patients in the current study, this re-alignment of expectations could be beneficial for the upcoming care and process. Personalized information has previously been demonstrated to be vital for the understanding and handling of back pain conditions [31]. Dissimilarities between the expectations of the patient and the physician can be a disadvantage [32], which emphasizes that patient communication, including regarding expectations, should be prioritized.

Two thirds of the patients in the present study had unchanged expectations. This result is not surprising, considering the chronicity surrounding these complaints. Sanderson et al. [33] investigated how expectations changed over 3 months in subjects with low back pain, and no change was found. This finding suggests

Table 3 Univariable and multivariable linear regression models for predictors of positive change in expectations (PSOE; dependent variable) after the consultation

Predictor (independent variable)	Univariable models			Multivariable model		
	Estimated regression coefficient	95% CI	p-value	Estimated regression coefficient	95% CI	p-value
Number of pain sites	0.021	−0.138 to 1.180	0.796	0.000	−0.148 to 0.147	0.996
Marital status (married/partner/single)	−0.359	−1.105 to 0.386	0.343	−0.007	−0.644 to 0.631	0.983
Pain and function*[1]	0.171	0.009 to 0.333	0.039**	0.013	−0.159 to 0.185	0.881
Smokers (daily)	0.105	−0.766 to 0.977	0.812	0.193	−0.581 to 0.968	0.624
Use of analgesics (daily)	0.024	−0.264 to 0.312	0.870	−0.095	−0.387 to 0.196	0.520
Sex (female)	−0.594	−1.261 to 0.073	0.081	−0.295	−0.903 to 0.312	0.339
Language (Norwegian)	0.330	−0.664 to 1.323	0.514	−0.436	−1.326 to 0.453	0.335
HSCL-10 > 1.85	0.471	−0.093 to 1.036	0.101	−0.387	−0.996 to 0.221	0.200
Time of waiting (days)	0.005	−0.004 to 0.014	0.248	0.005	−0.003 to 0.012	0.200
Education (higher)	0.200	−0.144 to 0.544	0.254	0.206	−0.105 to 0.517	0.192
Age	0.017	−0.005 to 0.040	0.127	0.019	−0.002 to 0.039	0.077
Sick leave (yes/no)	0.389	−0.315 to 1.093	0.277	0.738	0.080 to 1.395	0.028**
Neck/back or shoulder diagnosis*[2]	0.662	−0.033 to 1.357	0.062	0.733	0.105 to 1.361	0.022**
PSOE exp. Before consultation	0.520	0.438 to 0.602	0.000**	0.548	0.453 to 0.644	0.000**

HSCL Hopkins Symptom Checklist-10 (HSCL-10), cut-off of 1.85, *PSOE* Patient Shoulder Outcome Expectancies, *Exp.* expectations
**Significant at $p < 0.05$
*[1]PainFunction: mean 11NRS pain and functioning baseline scores
*[2]Diagnosis categorization in additional file 2

that expectations may be fairly stable, at least over shorter time spans. A prolonged duration may reduce expectations regarding recovery, and pain and movement limitations may challenge positive attitudes. However, the aforementioned study is not directly comparable to our study due to the specific interventions and method of randomization of patients used. Perhaps the lack of change within both studies implies that expectations are fairly stable in patients with chronic conditions. Vasseljen et al. [34] reported that the majority of back pain patients experienced little change in their pain status over 1 year.

Nevertheless, an intriguing question is what a "proper" change in expectation would be. The literature refers to realistic expectations [12]. Two persons with similar conditions could therefore be dissimilar in their change in expectations compared to the initial expectations. It is challenging to predict what a realistic expectation is, few musculoskeletal diagnoses have a pre-determined progression, and individual variation must also be expected.

In the current study, the regression analyses revealed that few clinical or demographic factors were associated with changes in expectations regarding improvement in pain and function: only sick leave and diagnosis were found to be statistically significant (as discussed below). Patients on sick leave due to the neck/back/shoulder problem had increased positive expectations after the consultation. Unfortunately, directly comparable literature considering changes in expectations is scarce, and we were unable to find comparable literature regarding sick leave. However, Reme et al. [35], among others, indicated that pessimistic expectations delayed work return in a low back pain population. Perhaps this subgroup of patients should receive specific communication addressing their expectations. However, the homogeneity of the group, with few significantly divergent predictors, is surprising because the literature frequently suggests associations between expectations and patient characteristics and/or socioeconomic factors, as summarized by Bialosky et al. [16], among others. However, our study investigated changes in expectations, and the lack of similar literature challenges interpretation. Perhaps the absence of divergent predictors is caused by unrevealed factors affecting the change in expectations that were not considered here. Topics of possible interest include aspects of personality, other psychological traits, self-efficacy and patients' explanatory models. It has also been previously demonstrated that social relationships and previous experiences with health care are important [36], neither of which was examined here.

A final aspect is the comparison of expectations between patients with shoulder complaints and patients with neck/back complaints. Several significant differences were found between the two groups in terms of patient characteristics. The patients with neck/back complaints had a statistically significantly higher level of

emotional distress, as previously observed by Pincus et al. [37]. Patients with neck/back complaints also reported a lower education level and an increased NPS, the latter supporting the finding of Kalamari et al. [27]. An increased NPS could explain the elevated use of analgesics among the patients with neck/back complaints. When comparing expectations between the two patient groups, the patients with shoulder complaints appeared both to be more optimistic before the consultation and to a higher degree change their expectations in a positive direction during the consultation. Perhaps expectations are not subject to generalizations, and perhaps different patient groups should receive more individualized assessments of their expectations. However, expectations within various joint conditions are rarely compared in the literature.

The present study has several limitations that should be considered. Firstly, the included patients were primarily Norwegian, and invariance across cultures cannot be assumed. Considering the increased multicultural tendency in most Western countries, this limitation is perhaps unfortunate. Secondly, several PMR physicians conducted the consultations, and no adjustments were performed for their personalities, communication skills or clinical experience. Additionally, the physicians were not instructed in any particular way, and the different contents of the consultations were not taken into account. Perhaps recording of particular topics, such as addressing and/or discussion of expectations, could have provided insight into the detected changes in patient expectations. Thirdly, it is unfortunate that only sick leave, and not occupational status, was recorded. Fourthly, it is also a shortcoming that missing data in the non-completer group may have biased the comparison between completers and non-completers. It is uncertain why the non-completers had a shorter time of waiting between referral and the consultation. Fifthly, the general questionnaire, recording patient characteristics, was sent out along with the appointment letter and was filled out before the consultation, but the exact timing of this is uncertain, as the questionnaire was only returned on the appointment day. Finally, throughout the discussion, we have emphasized the unfortunate lack of comparable literature to challenge both the interpretation and the discussion of our results. The field of musculoskeletal expectations overall suffers from a shortage of tools for measuring expectations [38], which prevents systematization of the topic. Furthermore, "expectation" is a vague term that could be interpreted differently in different studies. We support Haanstra et al. [3] in calling for a more precise description of the term to optimize future research.

In our opinion, the current study is of note despite the mentioned limitations. Changes in expectations during a consultation have not been previously examined, and variations among patient groups have only been weakly addressed.

Conclusion

This study suggests that expectations regarding pain and function change during or shortly after a PMR consultation. Approximately one quarter of patients attending their first PMR consultation change their expectations in a more positive direction after the consultation, while 10% of patients change their expectations in a negative direction. Hence, expectations can be influenced by a single specialist consultation. Among clinical prognostic factors, only sick leave was found to influence the changes in expectations. Overall, there is a lack of comparable literature, and more information will be required to more fully understand the potential clinical value of expectations.

Additional files

Additional file 1: Questionnaire (Name: questionnaire.pdf, Title: Questionnaire. Description: questionnaire). (PDF 121 kb)

Additional file 2: Classification of diagnosis (Name: classification_diagnosis.pdf, Title: Classification of diagnosis, Description: Classification of neck, back and shoulder diagnosis). (PDF 123 kb)

Abbreviations

GP: General practitioner; NRS: Numeric rating scale; OUS: Oslo University Hospital; PMR: Physical medicine and rehabilitation; PSOE: Patient Shoulder Outcome Expectancies; RCT: Randomized controlled trial

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Availability of data and materials

The raw data in a de-identified form are available and could be provided from the first author.

Authors' contributions

SS: has contributed to the conception and design of the study, the acquisition of the data, and the analysis and interpretation of the data and has drafted and reviewed the manuscript. CR: has contributed to the design of the study, the data collection and the interpretation of the data and has reviewed the manuscript. MWF: has contributed to the design of the study and the analysis and interpretation of the data and has reviewed the manuscript. LPG: has contributed to the conception and design of the study and the analysis and interpretation of the data and has reviewed the manuscript. All authors have critically revised the manuscript and approved the final manuscript. All authors agree to be accountable for all aspects of the work by ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Competing interests

No benefits in any form have been or will be received from commercial parties related directly or indirectly to the subject of this manuscript. All authors declare that they have no competing interests.

Consent for publication
Not applicable.

Ethics approval and consent to participate
This study was approved by the Data Protection Office at Oslo University Hospital, 2012/2574. Written consent to participate was received from the patients.

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