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Original article

Aspects influencing clinical reasoning and decision-making when matching treatment to patients with low back pain in primary healthcare

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A B S T R A C T

Background: It is unclear how physiotherapists match treatment to patients with low-back pain (LBP) in primary healthcare. A further exploration of physiotherapists' perspective of matching treatments to the individual patient in this setting is needed.

Objective: The aim of this study was to explore and describe aspects influencing physiotherapists' clinical reasoning in the decision-making on individualized treatment of LBP in primary healthcare.

Design: This was an explorative study using qualitative content analysis.

Method: Fifteen semi-structured individual interviews were conducted with physiotherapists, men and women, experienced and novice, working in primary healthcare settings in one sparsely populated region and in one larger city in Sweden.

Findings: Two overarching themes were identified influencing decision-making for individualized treatment of LBP: 1) *Matching requires differentiation and adaptation*, with categories describing specific patient characteristics, assessment findings and treatment adaptations (*classification of pain and bodily findings; patient physical capacity and emotions; patient awareness and motivation; treatment combinations and atypical treatment rationales*): and 2) *The tension between trust and barriers*; with categories describing aspects of physiotherapists' convictions, constraints and working environment (*confidence in treatments and oneself*; *physiotherapists' terms overrule patients' preferences; personal constraints and workplace approach and priorities*).

Conclusion: This study describes aspects of the patients, the physiotherapists and their workplaces that influence decisions for individualized treatment of LBP. The findings underpin the need for clinician self-reflection, initiatives for skilled clinical competence and the weight clinician observations carry on the complex treatment selection process which need to be appreciated when implementing evidence-based recommendations in clinical practice.

1. Introduction

Low-back pain (LBP) is a complex, global health problem and the greatest cause of years lived with disability (Hartvigsen et al., 2018; Hoy et al., 2015; Murray, 2018). In most cases of LBP the exact cause cannot be determined (Violante et al., 2015), therefore challenging the use of diagnosis as primary guide to treatment (Bickenbach et al., 2012). Self-management and physiotherapy are recommended as first line LBP treatment (Foster et al., 2018). There is, however, limited evidence for the effectiveness of most physiotherapy treatments (Chou et al., 2016; Stochkendahl et al., 2018; Wong et al., 2017). Such evidence, constitutes of results from randomized clinical trials (RCTs), with advice applicable to populations of patients only, limiting their use for the guidance for individualized treatment decisions (Elwyn et al., 2015; Mulder et al., 2018). Further, limitations of RCTs investigating LBP treatment effectiveness include overlooking the LBP heterogeneity, i.e. the different phenotypes and trajectory patterns, as well as using uni-dimensional outcome measures, when most physiotherapy treatments target multiple factors and recovery is multidimensional. (Hancock and Hill, 2016; Kongsted et al., 2016). Therefore clinicians need to decide whether guideline recommendations are relevant to the care of the individual patient (Haynes et al., 2002). Clinical reasoning, a cognitive process preceding decision-making and treatment, should include components of best available research evidence, clinical expertise and patient preference (Haynes et al., 2002; Satterfield et al., 2009).

Yet, such reasoning in daily clinical practice is not well understood and a further understanding of the decision-making process for individualized LBP treatment is needed.

In theory, clinical reasoning is suggested to concurrently follow four analytical models during the patient encounter. Thus, the physiotherapist uses these models to generate initial hypotheses and tests these through questioning and physical examination (hypothetico-deductive reasoning), recognizes prior experienced clinical patterns

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(pattern recognition), identifies clinical variables that together suggest a treatment (clinical prediction), and subsequently forms an understanding of the patient's story (narrative reasoning) (Childs et al., 2004; Doody and McAteer, 2002; Elstein, 1988; Flynn et al., 2002; Haskins et al., 2014; Haynes et al., 2002; Higgs J, 2000; Langridge et al., 2015; Mattingly, 1998; Noll et al., 2001; Patel et al., 1997; Payton, 1985; Satterfield et al., 2009).

Research in primary care settings has reported clinical reasoning being affected by diversity of aspects of external, patient and physiotherapist factors (Cruz et al., 2012; Davies and Howell, 2012; Josephson et al., 2011, 2013). External factors such as time constraints and safety issues have been highlighted (Langridge et al., 2015). Patient factors have been reported to be related to disorder origin (Davies and Howell, 2012; Jeffrey and Foster, 2012) and treatment expectations (Jeffrey and Foster, 2012; Josephson et al., 2013) as well as case complexity on the basis of life situation and help-seeking behaviour (Josephson et al., 2011). A bio-medical or bio-psychosocial practice orientation (Derghazarian and Simmonds, 2011; Simmonds et al., 2012) and whether practice is experienced- or evidence-based (Davies and Howell, 2012) are factors found related to physiotherapists, but also physiotherapists' gut-feelings (Langridge et al., 2015), pain beliefs (Simmonds et al., 2012) and personal attitudes have been reported to influence decision-making (Jeffrey and Foster, 2012).

LBP is recommended to be managed in primary healthcare (Foster et al., 2018), which in many countries is organized so that patients have direct access to physiotherapy (Bury and Stokes, 2013a). Such organization requires the physiotherapist's ability to make clinical judgements and decide on treatment (Bury and Stokes, 2013b). A review synthesizing results from quantitative and qualitative studies from outpatient settings concluded that physiotherapy treatment decisions in LBP are primarily bio-medically oriented, usually based on what would facilitate the relationship with the patient and on the expected patient engagement in treatment and/or self-management (Gardner et al., 2017). Still, there is limited research data describing physiotherapists' perspective of matching various treatments to the individual patient in primary healthcare. The aim of this study was therefore to explore and describe aspects that guide and/or influence physiotherapists' clinical reasoning and decision-making in individualized treatment of patients with LBP in primary healthcare.

2. Method

This study collected data through semi-structured individual interviews and used inductive content analysis (Graneheim and Lundman, 2004) to systematically explore, identify and organize informants' descriptions, with minimal interpretative meaning inferred by the researcher (Sandelowski, 2000). A text has messages that can be interpreted and abstracted, and for this reason a latent content analysis was conducted of the informants' responses. (Graneheim and Lundman, 2004). To cover variations in clinical practice the study included primary healthcare physiotherapists in various working conditions, in two heterogeneous regions in Sweden, one sparsely populated region and one larger city. Primary care officials in the two geographic regions identified clinics that employed one or more than one physiotherapist, respectively.

2.1. Informants and settings

Invitation letters were sent by mail or email to physiotherapists at 12 privately or publicly operated primary healthcare clinics, that are part of the Swedish social security system and provide direct access to physiotherapy. One reminder was sent in some cases. One clinic declined to participate. The remaining 11 clinics employed a total of 27 physiotherapists, and 8 of these clinics employed more than one physiotherapist. The demographics and characteristics of the included 15 volunteers from the 11 clinics are presented in Table 1.

Table 1
Informant demographics, characteristics and workplace settings (n = 15).

Variable	Value
Regions	
Informants in sparsely populated region	7
Informants in urban and suburban areas in a larger city	8
Gender; female/male	8/7
Age (y) median [IQR]	40; [23]
Clinical experience in years	
Median [in primary care; IQR]	10; [7; 23]
Workplace setting	
Public	9
Private practice/Employed at private healthcare centers	4/2
Postgraduate courses	
Acupuncture	14
OMT [a]/OMT[b]/OMT[c]	2/5/2
Sports medicine (postgraduate courses 15–60 credits)	2
MDT[d]	4
Basic Body Awareness	1
Pain and pain physiology (postgraduate courses 30 credits)	2

[a] OMT = Orthopaedic manual therapy: basic clinical postgraduate courses.
[b] OMT = 2-year postgraduate clinical diploma.
[c] OMT = university course without clinical auscultations (30 credits).
[d] MDT = Mechanical Diagnosis and Treatment: level A and certificate.

2.2. Data collection procedure

The first author conducted all semi-structured face-to-face audio-recorded interviews, ranging from 46 to 65 min (median 52 min), at the workplace of each physiotherapist. Question areas were identified within the research group and developed into an interview guide. The open-ended questions derived from clinical practice and were informed by literature describing aspects of clinical reasoning in clinical practice (Davies and Howell, 2012; Jeffrey and Foster, 2012; Langridge et al., 2015). The questions were tested in three individual pilot interviews with clinical physiotherapists in primary healthcare, not involved in the main study. Necessary adjustments to the interview guide were made, and the final version is presented in Table 2.

2.3. Analysis procedure

The interviews were listened to repeatedly and transcribed verbatim. The pilot interviews had provided insights into the interview situation and refinement of the interview guide, which meant that transcriptions were considered unambiguous, hence transcripts were not member-checked by informants. The analysis followed inductive content analysis procedure previously described (Graneheim and Lundman, 2004), and was carried out in the following steps: familiarization, condensation, coding, sorting, grouping, labelling, extracting themes and refining. Specific actions taken at each step in the researcher triangulation are presented in Table 3. The entire transcribed

Table 2
The questions included in the interview guide.

Would you please,
- describe the treatments you use in LBP in your daily practice?
- tell me what you think makes you select these treatments?
- describe your thoughts on examination procedure in regard of treatment selection?
- describe your thoughts on the role of intuition/gut feelings in decision-making?
- describe how you end up with a treatment selection?
- is there something you can think of that could support you in your decision?
- is there something more you want to talk about or add?

Table 3
Specific actions and steps in the analysis procedure and researcher triangulation.

Steps	Actions
Transcriptions	The first author (BW) transcribed all interviews.
Familiarization	BW listened to the all recordings and read transcripts concurrently. The co-authors (CB and EBR) authors read all transcripts.
Condensation	One selected interview (interview X) was partly condensed by all authors into meaning units corresponding with the aim of the study. BW completed the condensation and continued to condense the rest of the material.
Coding	BW and CB coded interview X separately and reviewed it together, after which BW coded the rest of the material.
Sorting, grouping, and labeling categories	Codes from another selected interview (interview Y) were sorted by comparing similarities and differences and grouped into categories and labelled separately by each author. Categories were further reviewed by BW and CB together. Codes from a further selected interview (interview Z) were managed the same way by BW and CB, and ERB reviewed the results and made comments. BW continued this process with the rest of the material.
Continued sorting and grouping	All categories were further grouped based on a comparison of similarities and differences in a way that covered content, but still reduced the number of categories. This process was reviewed by all authors in an iterative way. BW went back to the full interviews as well as to the condensations and codes for additional reading in effort to remain in line with the data. Preliminary categories were reviewed in a group with a mix of male and female doctoral students and researchers, with experience from various areas in the musculoskeletal field.
Extracting themes and refinement	Themes were derived from the categories and discussed by all authors iteratively.

Table 4
Example of meaning units, condensations, codes, and categories used in the analysis process.

Meaning unit	Condensation	Code	Category
(For treatment selection) … firstly … in the history taking I try to make out who it is that I have in front of me …. and find out how their life is …	For treatment, the patient history tells me who the patient is and how their life is	Patients' history and life affect treatment	Treatment adaptation to patients' situation

text was read through to gain an overall impression of the material. The obtained data was considered to provide details and variations that adequately could represent aspects influencing decision-making (Morse, 2015). Words, phrases, or sentences with a common meaning were identified and defined as meaning units. Condensation of meaning units and coding of was performed with minimal interpretation (Table 4). The coding process was done in Open Code (2013). Codes were grouped into categories, and categories with similar meaning were in turn grouped together and labelled such that they covered the content of the included categories. Final categories were created and reviewed. The extracted themes were intended to express the underlying meaning and a common thread found in the categories and subcategories. Throughout the analysis, the process moved back and forth through the steps iteratively.

2.4. Ethical considerations

An advisory opinion without objections was obtained from the Regional Ethical Review Board in Stockholm (Dnr 2016/380-31/4), and permissions were granted from primary care officials in the respective areas and the heads of department at the respective healthcare centers. Informants were given written and verbal information about the study prior to their informed written consent to participate. Informants' identities were handled with confidentiality throughout the research process, by giving informants codes in the transcriptions.

3. Findings

Two overarching themes were identified, *Matching requires differentiation and adaptation,* and, *The tension between trust and barriers.* The themes, categories and related quotations are presented in Table 5 and are described as follows. To further illustrate findings the themes and categories have been inserted into a current clinical reasoning model (Jones, 1995) (Fig. 1).

3.1. Matching requires differentiation and adaptation

This theme encompasses the informants' classifications of patient characteristics and assessment findings that influence treatment matching as well as ways of adapting treatments to match the individual patient.

3.1.1. Classification of pain and bodily findings

Informants expressed a diversity of classifications based on pain, symptoms and signs. They described pain classification on the basis whether pain was driven by peripheral or central mechanisms, and whether peripheral nerve tissue was involved. Painful movements were classified as being regional or segmental, and whether range of motion was altered. Judgment of how easily pain is exacerbated and timeframe for pain to subside (i.e. symptom irritability) were to some pertinent for the perceived tolerance for subsequent treatment. Others seemingly did not consider such information. High pain intensity and/or sciatica/neurological symptoms were considered needing cautious treatment, without provoking pain, and identify pain alleviating body positions. Informants expressed how specific bodily examination findings were decisive for specific treatment selections; hypomobility should be treated with active or passive mobilizations; signs of lumbar instability should be addressed with pain education and exercises targeting improved stability; reported muscle fatigue directed treatment towards exercises; and signs of muscle tension directed treatment to soft tissue techniques.

3.1.2. Patient physical capacity and emotions

The informants described how several patient related factors influenced their treatment decisions. The patient's usual physical demands and life situation were considered important how treatment was

Table 5
Resulting themes, categories and corresponding quotations. Quotations are condensations, in which the dots signify that a portion of the text has been omitted. Brackets include clarifications made by the first author.

Theme	Category	Quotations from Informants with Randomly Designated Initial Letter
Matching requires differentiation and adaptation	Classification of pain and bodily findings	**A:** "… I try to make out "is this a mechanical problem or not" … It is my main task to differentiate this [mechanical] pain from psychological …."
		N: "… the first categorization is what is the driving mechanism … is it mostly central or peripheral mechanisms … second what are the painful movements … and does it move too little or too much"
		C: "… if an apparent hypo-mobility is noted … that there is a resistance to rotation in one direction … then I can work manually with that during the first visits"
		F: … "if there is neurology in the radiating pain … these [patients] often have acute problem, those who have terrible pain … I want to be very cautious with those … pain relief, resting positions, and unloading.
	Patient physical capacity and emotions	E: "… if there is a lot of stress and anxiety, then I think it's important to create peace and quiet for that patient in some way and … a reasonable goal setting [in treatment] … get them to believe that they can change something …. and only introduce activity when trust is there"
		S:" … I try to read the person when they come to a visit, what their prior experience of activity is, how active they are … and how I can get them more active and maybe increase physical activity from a low level.
		L: "… one can call it physical background … if they have been sitting a lo t … or been mobile … what training … or physical activity they do … I always try to connect to that"
	Patient awareness and motivation	**F:** "… [treatment selection] is influenced by how …. the person … her motivation … how involved she is in her disorder … how she perceives what the problem is."
		M: "… you have a person in front of you … you must win their trust, or else there is not going to be a good cooperation."
		I: "… the most important for the treatment I prefer or recommend is to verify it with the patient, …what do you think of this..is this something that you think would work for you … so that I don't just decide … this is what you are going to do … you have to adapt to the individual [understanding]"
	Treatment combinations and atypical treatment rationales	**E**: "… I think that is good to use different … a mix of techniques … that has been my way to work clinically and I still find it successful."
		S: "… sometimes I use acupuncture as a gateway to get them going, then they come here … and I can talk to them [about activity] and move on … and when I feel I've got stuck and I need time to think".
		Y: "… you can use a light massage as part of … I don't know if one should call it a reward … but as way to strengthen the bond … that we are doing this together."
The tension between trust and barriers	Confidence in treatments and oneself	**N**: "… yes … I feel confident [in treatment selection], maybe not within the first half an hour … I usually spend much time at the first assessment … maybe … I do a trial treatment … but after that I feel quite confident … I really do."
		L: "I think I mostly use intuition [in selecting a treatment] or some sort of sense … I make a clinical assessment on all patients, for sure … to have a look at mobility and such … walking, sitting, stance … but … I primarily use my gut feeling."
		D: What one knows about LBP and exercise is that it has the best evidence of all treatments, and research shows that activity … that's what we need to do."
		C: "… There is a much greater chance that I will give a treatment if the patient has responded well [to that treatment] previously, for then I can get an effect from positive expectation
	Physiotherapists' terms overrule patients' preferences	**D**: "… I am an active person and I believe in activity, I always try to get them into training, and only occasionally can they get alternative treatment, but they never get to decide themselves."
		F:" I always have the requirement that for acupuncture or some other passive treatment there must be an active treatment component."
		S "If they have a direct desire for a treatment then I feel … but why? I'm a little afraid of passive treatments … I want them to do something themselves … I'm getting "warning signals"
	Personal constraints	**H**: "I am never sure on anything when it comes to backs … that is …. I personally find backs terribly complex … that is … it can be so many things … so, I am rarely or never sure".
		S: "… these stressed out patients … it's difficult … and there is not much I can do to help … I mean, with their pain … [the pain] is in the stress. I find it really hard to pick that up [psychological factors] when you have little experience and … that can be put aside a bit"
		F: "… above all, I have no training in [manual techniques] … that is nothing that I actively have chosen, but I haven't been given the opportunity to learn …"
	Workplace approach and priorities	**Y:**"… at my first job there was no manual physiotherapist, so it was lot of training from the very start, a lot of stabilization training, so I think that has shaped me … I think it's a lot about how the workplace forms you..[healthcare] expects us to make quick assessments … then follow-up treatment gets a lower priority … also … we have a priority order where 10–15 years of LBP is not prioritized …
		L:"… about exercises and training … it has changed a lot over the years … now it is about doing as few but as effective exercises as possible … I have abandoned extensive training, it is too demanding and there are not that many [patients] that can cope with it."
		T: "… if there is much to do you tend to use faster methods … such as laser, that's the fastest".

suggested and applied, and to what extent self-management could be expected. In patients with on-going long-term LBP treatment focus should be altered from “the experience of pain” to that of “physical activity”. Pain education and advice were considered a way to reduce patients' anxiety and to empower them to engage in self-management. The patients age could influence treatment decisions, considering the expected diagnoses and activity levels in different age categories. Still, it was expressed that physical capability rather than age guided treatment.

3.1.3. Patient awareness and motivation

The patient's understanding of their disorder and their motivation for treatment were put forth as pertinent for treatment application and patient participation. Patient education, including explanations of how pain can arise and persist, was considered important in treatment, but the amount was determined by the perceived interest the patient had in such information. To listen and be responsive to the patient's narrative and to gain their trust were reported to enhance patient participation and motivation. Individualized treatment was considered crucial, and a dialogue with patients on treatment selections was highlighted as way to enhance patient compliance with the treatment regimen.

3.1.4. Treatment combinations and atypical treatment rationales

Informants stated that mixing manual techniques, exercises, and/or modalities were a successful working approach and a way to reach patients. Informants considered patients were helped and satisfied with combinations of treatments, and most informants did not want to devote themselves to a specific treatment method. They described a pragmatic application of treatments to which wider benefits could be attributed, than traditionally recognized. For example, different modalities were used for pain relief but could also work as second-best treatments when other treatments had failed, or to gain time to elaborate on patients' problems or as starting point and gateway to active treatment. The usage of massage in treatment was described not only to relieve muscle tension and pain, but as way to strengthen the therapist-patient relationship.

3.2. The tension between trust and barriers

This theme encompasses descriptions of how informants' treatment selections are influenced by the tensions that consists of, on the one hand, their trust in treatments and their selves, and on the other, their personal and working environment limitations.

3.2.1. Confidence in treatments and oneself

Informants felt confident in the patient encounter and in when to treat and when not to. Although not always sure that their selected treatment was the “right” treatment, they felt confident that the introduced treatment would improve the patients' status. They were likely to use treatments that the patients had experienced as helpful earlier. The experienced informants recognized clinical patterns in patients and used treatment options they regarded as being successful in similar cases previously. Intuition was seen inseparable from experience and intuition was by some considered the primary factor in decision-making, sometimes even more so than the physical examination. Informants expressed confidence in several treatments. Physical exercise was in focus and considered effective and supported by evidence, especially motor-control exercises. It was, however, highlighted that such exercises could increase patients' movement fear-avoidance and therefore should accurately performed strengthening exercises (e.g. squats, dead lift) rather be used. Informants seemed confident that hydrotherapy reduces movement fear-avoidance and stiffness, modalities alleviates pain and manual therapy alliviates lumbar pain and improves lumbar mobility. Treatment progression, going from simple to complex exercises, in more challenging positions and with increased loadings, were described as pertinent.

3.2.2. Physiotherapists' terms overrule patients' preferences

The informants expressed how their personal terms and self-image affected treatment decisions. It was expressed that rehabilitation was explicitly the patient's responsibility and that the physiotherapist solely could decide the treatment, to which patients were expected to adhere. The informants' self-image of being an independent and physically active person were conveyed to patients so that these should be likewise, without reference to whether this was something the patient had expressed or wished to be. Informants were compliant to patients' expectations of active treatment, whereas motives for passive treatments were viewed with scepticism and should be avoided or conditioned by requirements of active exercise and self-management. Setting limits for treatment periods was stated as an approach to transfer responsibility to the patient, for self-maintenance. Informants were ambiguous regarding home exercises versus supervised exercises at clinics. Adherence and exercise performance related to home exercises were seen as problematic, but, at the same time, was supervised exercise considered an inadequate short-term solution, or even counter-productive, for future self-maintenance.

3.2.3. Personal constraints

The informants expressed that lack of competence and skills as well as feelings of uncertainty influenced their decision-making. They desired to be to be well-informed, do “the right thing”, and wished for better guidance by evidence. Some informants stated they kept up with science to back up their decisions. Others expressed a sense of insufficiency since high workload prevented them from being updated on scientific findings. There was an uncertainty around exercise selections and in what manner these should be applied to patients. In comparison to other musculoskeletal disorders, LBP was experienced as complex and challenging. Especially novice physiotherapists expressed shortcomings in their undergraduate training for the management of complex LBP cases and wished for more support and supervision from colleagues. Some informants expressed that they had not been given the opportunity to attend post-graduate courses. Others had attended post graduate courses in OMT and MDT, but later lost interest in the methods and expressed scepticism regarding their rationales. Not practicing manual techniques in daily practice lead to a loss of skills, but regaining these skills required an effort they were not willing to put in.

3.2.4. Workplace approach and priorities

Informants highlighted various external aspects in relation to workplace and healthcare organization that influenced treatment decision-making. They selected treatments that requires short time, reduced follow-up visits and prioritized new patients to handle everyday workload and to meet workplace priorities. They experienced that financial frameworks, rather than patient needs, governed the access to training facilities and the length of treatment series. Supportive treatment with long-term follow ups of patients with long term ongoing LBP had a low priority in the healthcare system which influenced such patients' access to care. Treatment approaches advocated at their workplace significantly influenced informants' practice patterns, sometimes in a way that made physical exercises their sole treatment approach. The experienced informants expressed that their practice had changed over time with adjustments to treatment popularity. Examples were abandoning extensive exercise programs using equipment, such as pulley machines, in favour of a few specifically targeted home exercises, with no or simple equipment (e.g. rubber bands).

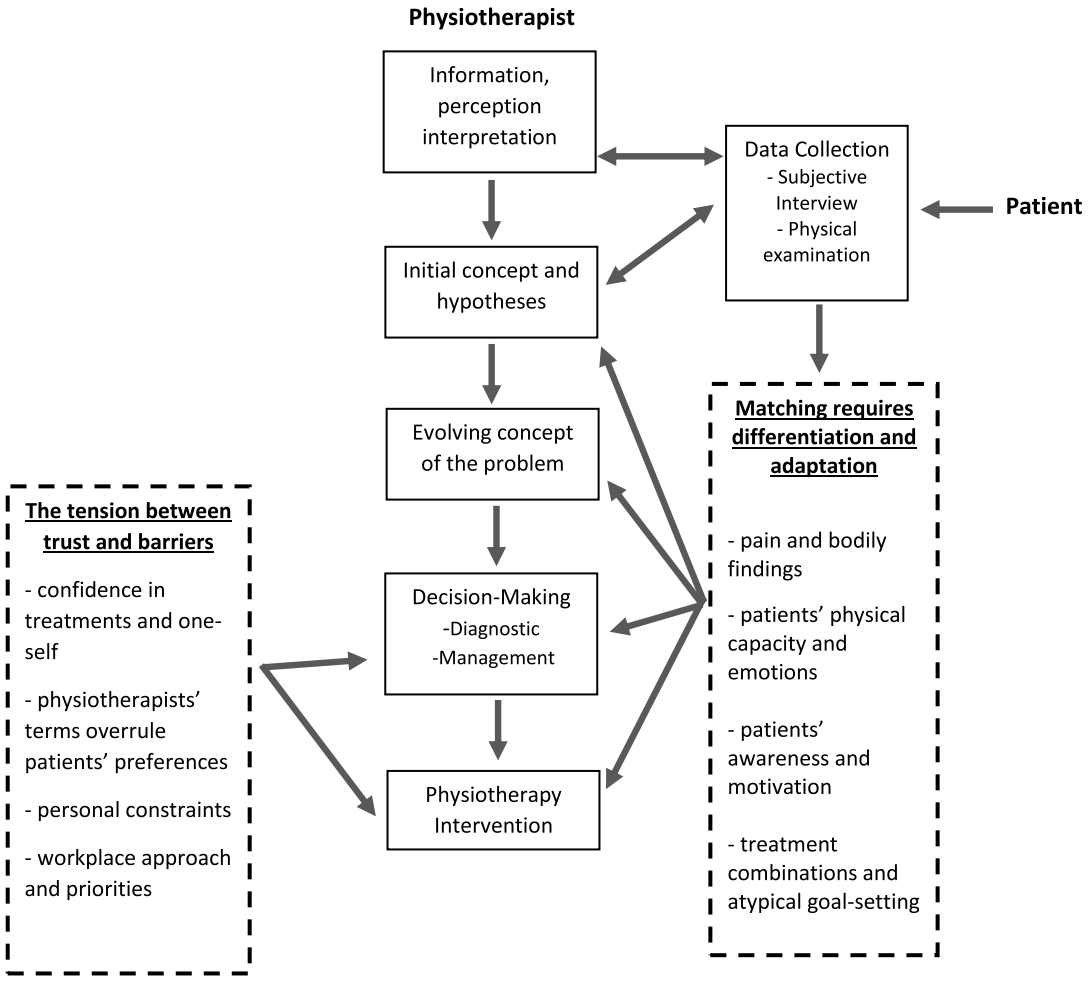

Fig. 1. Illustration of the themes and categories identified in the study (in dotted lines), included into a modified model (in solid lines) of clinical reasoning presented by Jones (1995).

4. Discussion

Our findings identify and highlight specifics in the patient characteristics and assessment, as well as in informants' working environment, personal convictions, constraints, and emotions that influence decisions for individualized care of patients with LBP in primary care. Further, it underpins a clinical perspective on the complexity of treatment matching not recognized in recent LBP recommendations and practice change suggestions in which scientific evidence is given prominence to. (Buchbinder et al., 2018; Foster et al., 2018).

Within evidence-based practice best available research and clinical expertise are considered equally important as patient's preferences in the decision-making process (Haynes et al., 2002; Satterfield et al., 2009). The classification of pain using references to pain distribution, central and/or peripheral mechanisms, nerve tissue involvement, acuteness and irritability of symptoms, are in line with bio-medically oriented pain beliefs, primarily shown to influence clinical reasoning in patients with persistent LBP (Daykin and Richardson, 2004). However, the informants showed a broader understanding of pain and its importance in the patients' life and put emphasis on reducing patients' anxiety and sought to build a trusting relationship with the patients. Although not a strict behavioural stratified approach (O'Sullivan et al., 2018), this shows an inclusion of a bio-psychosocial oriented approach stated necessary in clinical practice (Borrell-Carrio et al., 2004). The informants seemed to adhere to stated essential assessment techniques that obtain patients' perspectives of their current problems as well as measuring impairments, and considered patients' abilities, awareness, and emotions as well as specific impairments, when matching treatment to patients. Interestingly, combining treatments and applying treatment for atypical purposes were described as enhancing treatment effectiveness, reaching out to patients, handling complex situations and overcome personal shortcomings. Such pragmatic adaptations of treatment rationales have to our understanding not been described previously and pinpoint practice-based benefits of treatments not easily captured in treatment effectiveness studies.

Similarly to what's been previously reported from out-patient settings (Gardner et al., 2017), the personal convictions held by our informants' play an important role and set the terms for treatment selection. While other studies from primary care settings have shown that patient treatment expectations affect treatment selection (Jeffrey and Foster, 2012; Josephson et al., 2013), this was somewhat ambiguous among our informants. The informants expressed responsiveness to patients' expectations of active treatment, but some considered passive treatment preferences questionable and expressed that such treatment should be avoided or conditioned with active treatment elements. Such reasoning could originate from informants' clear focus on exercise and/or from personal convictions of an active and independent patient. It may also indicate how guideline recommendations of active interventions and self-management may counteract the implementation of shared decision-making if patient preferences are at odds with recommendations and clinician preferences (Stiggelbout et al., 2012). Sorting patients into "good" and "bad" patients, with "bad" being associated with a patient's passive nature, has previously been found to influence practice at outpatient settings (Daykin and Richardson, 2004;

Josephson et al., 2011). Such influence of personal values on clinical practice has put into question as to whether these values might influence patients' access to treatment (Gardner et al., 2017; Josephson et al., 2013).

Although informants considered patient participation fundamental in treatment and described several ways to enhance this, they also expressed that patients were un-interested in making treatment decisions and instead adhered to the treatments suggested by the therapist. Such belief is supported in a recent study in which patients with musculoskeletal disorders in primary care expressed their trust in their physiotherapists' judgements (Bernhardsson et al., 2017). Patients may, however, not expect to be involved in decision-making and there may be misconceptions of time and skills needed to involve patients in shared-decisions (Stiggelbout et al., 2012).

In line with previous research from primary and secondary care (Daykin and Richardson, 2004; Langridge et al., 2016; Potter et al., 2003), our informants expressed emotional aspects of reasoning and decision-making. They wished to be good at their work and felt confident in the patient interaction and when to treat or not. Notwithstanding, they experienced LBP as difficult and challenging and expressed feelings of insufficiency and doubt in how to select and/or apply treatments. They emphasized the importance of intuition in practice, which for some were the primary decision-making "tool". Physiotherapists' intuition in clinical reasoning (Langridge et al., 2015) has been described as emotional processes separated but co-existing with analytical reasoning processes (Langridge et al., 2016). Our informants, however, expressed that intuition and experience are equivalent, and these seemed to be used simultaneously, rather than separately, in the reasoning process. In line with studies reporting a low guideline awareness among physiotherapists at out-patient settings (Bishop et al., 2015; Derghazarian and Simmonds, 2011; Simmonds et al., 2012), our informants seemed unaware that in addition to exercise, clinical practice guidelines in persistent LBP also recommend education, advice, manual therapy, self-management, acupuncture, and multi-modal rehabilitation (Wong et al., 2017).

Our study adds external aspects influencing clinical reasoning in primary and secondary care practice to those reported previously (Langridge et al., 2016). Informants describe how the low priority patients with persistent LBP have in primary healthcare result in patients being left without support. Further, novice and experienced informants alike, highlight that the working approach advocated at their workplaces, the lack of continued postgraduate education and shortcomings in clinical reasoning skills, have profound effect on professional life. These findings show that developing clinical reasoning skills already during undergraduate education and collegial support of novice physiotherapists at workplaces as well as physiotherapists' lifelong learning, are essential for skilled clinical practice and person-centred care.

There is reason to believe that the clinical reasoning used by the our informants is congruent with theoretical clinical reasoning models (Langridge et al., 2015). Our findings show that diagnostic reasoning was associated with pain mechanisms and impairments, as well as with an effort to understand and interpret the patients' narratives. Such approach seems to follow "hypo-deductive reasoning" in combination with "narrative reasoning" (Edwards et al., 2004; Langridge et al., 2015). The inclination for using previously successful treatments in patients with a recognized clinical pattern demonstrates the use of "pattern recognition reasoning". Traces of "clinical prediction" are seen in that specific examination findings directly suggested a specific treatment. There is also reason to assume that the informants reasoning follows what has been described as clinical reasoning strategies (Edwards et al., 2004). These include decision-making on treatment (*procedure*); the implementation of treatment (*collaboration*); the establishment of the therapist-patient relationship (*interaction)*; the amount and content of patient education (*teaching*); the understanding of ethical dilemmas (*ethics*); and the envisioning of future scenarios (*prediction*) (Edwards et al., 2004). Our informants' differentiations and adaptations to patients' pain, symptoms, signs, abilities and emotions in the determination of treatment, as well as building trustful relations and empowering patients to participate in treatment demonstrate reasoning strategies of *procedure, interaction, education* and *collaboration*. *Ethics* reasoning was variably displayed, shown by the perceived impact healthcare priorities may have on treatment, but not apparent in the informants' description of clinical reasoning where the patients' treatment preferences could be overruled by informants' convictions. *Prediction* reasoning was not apparent in our data, apart from the importance of self-management to prevent recurrent LBP.

4.1. Methodological considerations and limitations

Qualitative research methodology is well suited for the understanding of clinical reasoning, and individual interviews are appropriate for the exploration of the tacit knowledge and thoughts held by physiotherapists (Elo and Kyngas, 2008; Malterud, 2001; Sandelowski, 2000). The used sample size is in line with recommendations for individual interviews (Kvale, 1996), and the sample heterogeneity in terms of geographic area, working conditions, and experience provided a variety of perspectives on the research question (Morse, 2015).

The interviewer (BW) is a specialist in orthopaedic manual therapy and an experienced clinical physiotherapist in primary healthcare and as such had a pre-understanding of LBP and the informants' work, making the interviews comfortable. Such familiarity is an asset as it facilitates judgements on the face validity of analytical decisions (Krippendorff, 2004). Such familiarity can, however, lead to un-reflected mutual understandings and inadvertently to bias in data collection and analysis. Although not apparent, any such bias might have been mitigated by the usage of researcher triangulation in the analysis process. The co-authors extensive theoretical and methodological knowledge of research within the field of rehabilitation and inflammatory rheumatic diseases (CB), LBP and primary healthcare (ERB), and pedagogics (CB, ERB), provided a broader understanding of the informants' experiences and thoughts. Further, the informants might have felt uncomfortable being interviewed by someone interpreted as more experienced than themselves. Such feelings might have been lessened by the interviewer being new to the research interview situation. That all researchers are female and physiotherapists is a further limitation, as a male perspective as well as input from various healthcare professionals might have resulted in alternative interpretations. The inclusion of informants with various clinical experience, in various settings and working conditions provided a depth and variation in the data. It is still possible that additional informants from other settings could have generated alternative aspects that might have added to our findings. Our study describes what is unique to a context where patients have direct access to physiotherapy and physiotherapy is a part of the social security system. Whether the results can be applied to where physiotherapy is organized differently is unknown.

5. Conclusion

This study identifies and describes specific patient characteristics, assessment findings and treatment adaptations influencing physiotherapists' clinical reasoning in order to match treatment to the individual patient with LBP, and further, that treatment decision-making is influenced by informants' trust in their selves and in treatments, and by their personal and working environment constraints. The findings underpin the need of clinician self-reflection on their role in providing individualized care, education initiatives that can enhance skilled clinical competence, the weight clinician observations carry on the treatment selection process and the complexity of daily clinical decisions that need to be appreciated in the implementation of evidence-based recommendations in clinical practice.

Conflicts of interest

None declared.

Ethical approval

An advisory opinion without objections, obtained from the Regional Ethical Review Board in Stockholm (Dnr 2016/380-31/4).

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Appendix A. Supplementary data

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