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International Journal of Nursing Sciences

journal homepage: <http://www.elsevier.com/journals/international-journal-of-nursing-sciences/2352-0132>

Original Article

Nurses' experiences with health care in pain clinics: A qualitative study



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ARTICLE INFO

Article history:

Received 16 August 2018

Received in revised form

15 February 2019

Accepted 5 March 2019

Available online 8 March 2019

Keywords:

Holistic care

Pain

Pain clinics

Pain management

Nurses

ABSTRACT

Background: Recent research has focused on the effectiveness of different treatment regimens in pain clinics, where a call for more multifaceted treatment has been highlighted. Less attention has been paid to improvements within pain clinics, and how registered nurses—who usually play a key role—perceive and experience the accessibility, treatment options and follow-up offers at public pain clinics.

Objective: The overall aim was to explore and describe how nurses experience health care provided to patients with chronic non-cancer pain at pain clinics.

Methods: We used 10 individual interviews with nurses working at 10 different public pain clinics in Norway. The interviews were analyzed using qualitative content analysis.

Results: One theme was developed from the content analysis: “Nurses’ striving to provide whole-person care in pain clinics.” The nurses experienced allocation of limited resources as challenging, especially when the dilemma between accepting new patients from the waiting list and offering follow-up to existing patients became apparent. Multifaceted treatment was perceived as vital, although resources, priorities, and theoretical understanding of pain within the team were challenging.

Conclusions: The needs for multifaceted and integrated treatments in chronic pain management were obvious, although this approach appeared to be too demanding of resources and time. Stronger cooperation between pain clinics in specialist care and health care providers in primary care to ensure better patient flow and treatment is required. Emphasis is placed on coherent theoretical approaches to pain management within the team in the pain clinics to ensure whole person care.

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1. Introduction

Chronic pain affects a large percentage of the general population: approximately one in five adults [1]. Chronic pain can be defined as pain in one or more anatomic regions that persists or recurs for longer than 3 months. It is associated with significant emotional distress or significant functional disability that cannot be better explained by another chronic condition [2]. Chronic pain management involves a shift from focusing on cure and diagnosis to focusing on care and rehabilitation [3]. Registered nurses (RNs) play a frontline role in caring for patients in pain, including the assessment and evaluation of pain, medicine management, and

interdisciplinary collaboration [4].

Patients with chronic pain in Norway are treated mainly by general practitioners and the municipal health service. Most patients with chronic pain referred to the specialist health service is examined and treated by organ or disease-specific units. Interdisciplinary pain clinics are reserved for patients with chronic pain that can not be adequately treated in the municipal health service or in the other specialist health services. Current recommendations from The Norwegian Directorate of Health to the pain clinics are expectations of an interdisciplinary team consisting of at least one RN with relevant expertise in pain management, in addition to a physician, physiotherapist and psychologist [5].

The biopsychosocial model provides a framework for understanding pain as a complex phenomenon resulting from biological, psychological, and social factors, where all aspects are relevant to managing chronic pain conditions [6]. However, experiencing pain not only affects an individual's biopsychosocial functioning but also their existential domains. Research shows that individuals suffering

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Peer review under responsibility of Chinese Nursing Association.

from chronic pain often wonder how life can be meaningful with their condition, as they are frequently cut off from sources of meaning that once were significant to them, such as having a career or being an active caregiver for children [7]. There has been little emphasis on the integration of these issues in health care despite the fact that the existential dimension is known to be an important factor in quality of life [8]. A whole-person care approach seeks to integrate the physical aspects along with the psychosocial and existential one, to better understand how to respond to patients' needs [9]. Thus, providing efficient whole-person pain care implies a multidimensional team-based approach [10,11].

A clear distinction has to be made between multidisciplinary versus interdisciplinary pain management. Multidisciplinary care connotes the involvement of several health care providers such as RNs, physicians, physiotherapists, and psychologists. However, the integration of their services as well as communication between the providers can be limited as they are often not co-located and might pursue treatments with separate goals that do not take into account the contribution of other disciplines [12]. Interdisciplinary care consists of greater coordination among all health care professionals, where all providers are co-located, sharing a common philosophy of rehabilitation and focusing on constant communication and active patient involvement [12]. Rehabilitation models based on a common philosophy, continuous communication, as well as active patient involvement are more successful than other rehabilitation models [10,13]. Although the biopsychosocial-existential approach is accepted widely, the corresponding introduction of interdisciplinary pain clinics has not always been actioned [3].

Recent research has mainly focused on the effectiveness of different treatment regimens with a call for more interdisciplinary treatment strategies [14]. Less attention has been paid to the progress achieved within pain clinics, and how the multidisciplinary or interdisciplinary approach toward chronic pain management has developed. RNs are often the first health care professional to learn of patients' pain problem, and are most likely to spend more time with patients than any other member of the team at the pain clinic [3]. Thus, RNs are particularly well positioned to identify gaps and strengths in health care provided at pain clinics. As such, more in-depth knowledge of nurses' perspectives related to care provided at pain clinics is required, and qualitative studies can contribute to this knowledge.

Based on these observations, the aim of this study was to explore and describe how nurses experience health care provided to patients with chronic non-cancer pain at pain clinics. Two research questions were formulated:

- How do nurses assess the health care provided at pain clinics?
- How do nurses experience working in teams at pain clinics?

2. Methods

2.1. Design

An exploratory and descriptive design was chosen using qualitative interviews to capture individual experiences. Exploratory design is used when little is known about the phenomenon to provide in-depth knowledge and a more nuanced understanding. The descriptive part sought to present the issues precisely.

2.2. Participants

We planned for a total population sample [15]. Initially one RN from each of Norway's 16 public pain clinics was invited to join the

study. The head managers of the Pain clinics were contacted by telephone and provided with basic information about the study. Extended information with a formal invitation to participate in the study was sent by email to the head managers shortly after the phone call. An appointment for the interview was scheduled with RNs who wanted to participate and who fulfilled the following inclusion criteria: being an RN; working with outpatients with non-cancer chronic pain; and with a minimum of 2 years training. One pain clinic did not meet the inclusion criteria (it did not employ RNs working with outpatients), one did not want to participate for unknown reasons, and four answered neither our emailed request nor the reminder. Thus, 10 RNs from 10 different pain clinics were included (Table 1). The participants were all state-registered nurses with a bachelor's degree in nursing and with different specializations. The number of years of experience varied between 2 and 19 years.

2.3. Data collection

Face-to-face interviews were conducted using a semi-structured interview guide. The researcher (First author) provided a structure based on the interview guide but allowed time and space for RNs' more spontaneous descriptions. The topics in the interview guide were the pain clinic's accessibility, treatment options, follow-up offers and team-based care. None of the participants knew the researcher, so they could speak candidly.

The interviews lasted for 50–75 min and were transcribed verbatim. The RNs were given a choice to conduct the interview at their workplace or at a neutral location (e.g., a conference room in a nearby hotel). All RNs preferred to conduct the interview at their workplace and provided a quiet and appropriate place to carry out the interview. The data analysis started directly after completion of the data collection.

2.4. Data analysis

The transcribed material was subjected to qualitative content analysis as described by Graneheim and Lundman [16]. Qualitative content analysis focuses on subject and context and emphasizes variation such as similarities and differences between parts of the text [17]. It also offers opportunities to analyze both manifest and latent contents [17]. Descriptions at the manifest level, which is close to the participants' descriptions, were performed early in the analysis when we developed codes and categories. Then we identified the latent content, or the underlying meaning, when developing subthemes and theme. The subthemes and theme developed in our analytic process were derived from the data material. Table 2

Table 1
Characteristics of participating nurses.

Characteristics	Frequency
Sex	
Female	10
Male	0
Clinical experience (year)	9.4 ^a
Registered nurse (RN) ^b	10
Specialty	
Anaesthesia	4
Intensive care	1
Psychiatry	1
Other relevant courses ^c	4

Note.

^a Mean of clinical experience, range 2–19 years.

^b State-registered nurse with a bachelor's degree in nursing.

^c Cognitive therapy, pain & palliative care.

Table 2

Overview indicating the abstraction process from categories to theme.

Categories	Subthemes	Theme
The significance of accessibility The significance of follow-up offer The significance of medical treatment	Optimal allocation of service is challenging	Nurses' striving to provide whole person care in pain clinics
The significance of psychosocial treatment The significance of team-based care	Multifaceted treatment is important but challenging	

gives an example of qualitative content analyses, indicating the abstraction process from categories to theme. Table 3 outlines our analytical process and involvement.

2.5. Trustworthiness

We used the credibility, dependability, confirmability and transferability criteria as presented by Lincoln and Guba (1985) in addition to the consolidated criteria for reporting qualitative research (COREQ) to ensure trustworthiness of the study [18,19].

We have provided a detailed description of the analytic steps and an example of the analytic process. Representative quotations have been presented to give the RNs a clear voice. Overall, this contributes to the transparency and credibility of our findings, as it allows the reader to look for alternative interpretations. The dependability of the research was ensured through use of the same interview guide with each participant, in addition to transcribing all interviews verbatim. The transferability of the findings to similar conditions can be considered by taking into account the participants' context. Furthermore, the findings address several challenges of relevance to RNs and other health-care providers interested in chronic pain management worldwide.

The concept of "information power" may guide adequate sample size in qualitative studies [20]. Here the size of the sample was influenced by a specific aim (care provided at pain clinics) with dense specificity (RNs' experiences), along with the applied whole person model of care. All interviews were conducted by the first author. An in-depth qualitative content analysis was performed following Graneheim & Lundman [16]. Thus, including 10 pain clinics across Norway provided rich and nuanced descriptions of the phenomena, and the sample had satisfactory information power to develop valuable knowledge related to our aim.

2.6. Ethical considerations

The study was approved by the Regional Committees for Medical and Health Research Ethics, Norway (Project number 2014/2165). Every participant provided informed written consent ahead of the interview. The participants received information both in writing and verbally about their right to withdraw at any time and were assured that their participation was anonymous.

Table 3

Overview over the analytic process.

Stages of the Analytic process	
1. Open reading	First author read each script several times to gain an impression of what was being said.
2. Identify meaning units	First author identified patterns in the data by dividing the text into meaning units.
3. Condense meaning units	First author condensed the meaning units into a more formalized and written style.
4. Create codes	First author created codes to label.
5. Sort into categories and subthemes	Compared the codes based on differences and similarities, and sorted them into categories. Continuously discussed tentative categories and subthemes with co-authors.
6. Formulate into theme	Formulated the latent content of the theme in collaboration with co-authors.

3. Findings

The data provided rich and detailed descriptions of the RNs' experiences of provided care at pain clinics. One theme was developed from the content analysis: "Nurses' striving to provide whole-person care in pain clinics." The following section is arranged by the two subthemes of "Optimal allocation of services is challenging" and "Multifaceted treatment is important but challenging". In the following, representative quotations are presented to give the RNs (named from A to J) a voice.

3.1. Optimal allocation of services is challenging

The RNs expressed concern about limited resources that influenced their ability to provide necessary and timely healthcare, as well as difficulties in prioritizing follow-up of existing patients as this extended the waiting list at the pain clinic. This sub-theme consists of the following two categories: "The significance of accessibility" and "The significance of follow-up offer".

3.1.1. The significance of accessibility

The RNs described an optimal prioritization of resources as challenging. Sometimes they felt that it became rather random as to which patients received help at the pain clinic as incomplete referrals were a recurrent problem. This experience was also strengthened as they regularly found that referring GPs wrote referrals based on what they believed the pain clinic wanted to hear, rather than the correct status of the patient's pain situation and the purpose of the referral. Either the incomplete referrals were rejected by the pain clinic along with advice for a more detailed referral, or they contacted the general practitioner (GP) for supplementary information. The RNs highlighted the possibility for GPs to make contact if they had any questions regarding referrals, or to seek advice by phone instead of referring the patient to the clinic for small matters, such as minor changes in medication.

"They [the physicians at the pain clinic] have discussed issuing individual rejections with a proposal for further progress. Both the patient and the GP have received this very well. We often see that there is a call for 'backing' to get a second opinion both from the patient and the GP." (E)

To get a referral, there was a criterion of not having any ongoing

litigation relating to insurance or work capacity. Completing their medical examination was also a criterion, but the RNs experienced this as difficult to enforce as many patients strove to accept their pain situation. Therefore, many of the patients were still searching for a diagnosis and a cure when they arrived at the pain clinic.

“Patients should be examined, without looking for symptoms for something wrong when they arrive [at the pain clinic]. We want to reject patients who do not accept this because it is too much work for this department. However, there can be a distinction between when the GP says that they have been fully examined, and when the patient thinks so.” (A)

Some of the pain clinics strictly followed the waiting list, while others considered the needs and situation of each patient. The RNs described challenging assessments in this regard, as they often experienced difficulties in providing flexible and timely healthcare due to long waiting lists and limited resources.

3.1.2. The significance of follow-up offer

The RNs reflected over individual assessments related to any necessary follow-up. They experienced it as a difficult problem to decide whether to accept new patients on the waiting list or to prolong the follow-up of existing patients. As the resources were often minimal, the prioritizing of essential follow-up or accepting new patients was demanding. In such dilemmas, it was important to have other offers at the community level to refer patients to, such as coping seminars or rehabilitation programs.

“I usually say this when we begin: eight to 10 times. However, there are those who only need two to three hours to adjust to something. Then there are some times when we discover things along the way when we start working on it, that things are much more complicated than we had imagined. Then I find it hard to say: No, now it has been 10 times, you cannot come here any longer. We have to show flexibility.” (F)

One consequence of ending the follow-up too quickly was referrals. These were accepted and evaluated by most of the clinics. The RNs also recognized the need for new courses when the patient's life situation changed.

“A few years go by and along comes a new referral; the patient needs refreshment, a new boost. It is not the case that once one has been here, one must be able to use these skills for one's whole life. In life, it fluctuates, and one benefits from refreshment in relation to thoughts, emotions, and coping.” (C)

3.2. Multifaceted treatment is important but challenging

The RNs experienced the patients' need for multifaceted treatment as obvious, since most of the patients wanted help to deal with complex pain situations. A bio-psycho-social approach to pain management was thus considered to be fundamental. However, the RNs perceived multifaceted and team-based care as challenging as they experienced different priorities and theoretical understanding of pain between the various professions in the team. This sub-theme consists of the following three categories: “the significance of medical treatment”, “the significance of psychosocial-existential treatment” and “the significance of team-based care”.

3.2.1. The significance of medical treatment

The RNs experienced that some patients needed infusions or

blockades to be able to survive the day; for others, they were one of the many important pieces of the puzzle in their pain management. Another aspect was the importance of pain-relieving medication, also including opioid pharmacotherapy, to make the patients more available for cognitive approaches, or to give them some breathing space. While acknowledging the importance of medication in chronic pain management, the RNs also reflected on the mixed opinions concerning injections, blockades, and infusion.

“We offer infusions. However, this is to a limited extent in comparison with the past. We have been working hard to achieve this reduction. When I started [at the pain clinic], we had 100 individuals receiving it, but now it is maybe 10 and only for a limited period. We are now in a position to defend this use.” (G)

The RNs experienced particularly infusions, injections, and blockades as treatment with several drawbacks. This kind of treatment made the patients dependent on regular appointments at the pain clinics, where they would become frightened of a stressful period if they did not receive a new blockade or infusion, for example, before holidays.

“We [the pain clinic] were very drug-intensive, extremely drug-intensive. I saw that something was missing. Because if you are just treating by blockade, you will get phone calls that if they don't get help now, then their holiday will go badly. They want us to guarantee that they can live the life they actually cannot manage any more.” (H)

The RNs also assessed this kind of medication as a short-term solution, where a focus on assisting patients to manage their life and pain situations was absent.

“We [the pain clinic] believe that providing blockades over a long period is not beneficial for the patients. They become so dependent on us. They may well improve for a short period and then worsen when the pain returns, rather than finding a better balance in their lives. It is better to be concerned with life than with the next blockade.” (J)

3.2.2. The significance of psychosocial-existential treatment

A psychosocial approach was integrated at all pain clinics. Supportive conversations, peer groups, self-management programs, or cognitive therapy courses were typical kinds of psychosocial-existential treatment that were offered. Some of the pain clinics also presented follow-up by psychiatrists or psychologists, or RNs with a Master's qualification in mental health care or similar. The RNs assessed psychosocial-existential treatment as essential for developing the patients' coping strategies and bio-psychosocial functioning.

“I have been surprised how much psychiatry plays a role in this and how much heavy mental baggage many have, and moreover, how this manifests itself as pain.” (E)

The RNs wished to offer more psychosocial support for patients to be able to plan and live their life, instead of just planning and waiting for their next infusion or injection. They also experienced to succeed the most through psychosocial-existential treatment.

“There is less and less use of drugs [initiated by the pain clinic]. People strive to handle life, handle reduced functioning, and accept a reduced functioning. Many who have been treated here, who we consider successful, later say that the pain has not gone away, but

that it has become a smaller part of their life. This is perhaps where we succeed the most.”(C)

3.2.3. The significance of team-based care

The RNs emphasized that an interdisciplinary team including at least RNs, physicians, physiotherapists and psychiatrists with a common incorporated philosophy and constant communication was their desired goal. The RNs also experienced interdisciplinary teamwork as providing quality assurance.

“We are an interdisciplinary pain clinic and emphasize not working sequentially, but in unison so that the interdisciplinary approach brings all professional groups together at the same time. We can expand perspectives by listening to each other. Each of us has a position and competence, and when we present each of our approaches to the problem, we generate a good dialogue about the pain problem that the patient is suffering from. We learn a lot from each other, while achieving quality assurance and accomplishing good professional development at the same time.” (D)

The pain clinics varied in size and resources, and some provided less organized multidisciplinary pain care, where different health care professions worked side by side, with more formalized and scheduled meetings. The RNs experienced that the members of such multidisciplinary team did not necessarily have the same understanding or approach toward chronic pain and its management. Distinct differences between the team-members were experienced through different rank of priorities.

“We attempt to have an interdisciplinary meeting once a month, or four times in 6 months. We manage this, but the doctors usually cannot. It is a problem; our doctors are anesthetists for whom saving lives is the priority. We should have doctors who only work with us at the pain clinic, without any other agendas.” (H)

“Here [at the pain clinic] we focus on a biopsychosocial understanding of pain. It summarizes everything we do, it is fundamental. The anesthetist spent some time on this. He said he had to change his mind-set quite a bit.” (E)

The RNs experienced team-based care as being very resource-intensive. When all team members should be at the pain clinic at the same time, in addition to having full-time positions, the financial and logistical burden became too great for some of the pain clinics. Several pain clinics also had vacant positions because economic restrictions had downsized the physiotherapist and psychologist positions to half-time or less. These positions then became unattractive and were left vacant.

4. Discussion

The overall aim of this study was to explore and describe how RNs experience health care provided to patients with chronic non-cancer pain at pain clinics. Our findings illustrate that an optimal allocation of services at the pain clinic was challenging. The RNs experienced that the patients referred to the pain clinic were still searching for a diagnosis and a cure for their pain condition; thus, working to change the focus from cure to care to stimulate acceptance and coping strategies was time-consuming. A multidisciplinary pain clinic approach is usually introduced to patients at a very late stage and often as the last treatment option when other interventions have failed [21]. Before patients visit a pain clinic, they have usually undergone months or years of medication, which

primarily follows the biomedical model that focuses on cure and diagnosis [12,14]. By definition, chronic pain cannot be cured in the conventional biomedical sense. Rather, the patient who is suffering from pain must be given tools to manage their long-term pain, to live a fulfilling life in spite of it [22].

As the shift from cure to care is vital here, a dilemma became apparent between accepting new referrals and providing follow-up because of limited resources. However, patients with chronic pain often do not improve to the point that they no longer require medical management or other treatment strategies [23]. This implies significant challenges in primary care, as the patient often has a recurrent need for complex follow-up also after receiving help at the pain clinic. The RNs proposed closer collaboration between specialized pain clinics and health care professionals in primary care settings to provide a more flexible treatment process. This implies the need for more flexible pain clinics with low threshold services regarding second opinions or minor issues such as changes in medication or refresher coping and rehabilitation courses. In addition, an increased focus on the shift from cure to care in primary health care ahead of referral to the pain clinic could be beneficial to achieve a better allocation of resources.

The RNs commented that some patients referred to the pain clinic wanted a quick fix in the form of more medicines in tablet form, but also as infusions, blockades, or injections. The RNs acknowledged medication as being an important piece in the larger puzzle, but they also reflected on a number of drawbacks. In particular, blockades and infusions for therapeutic benefits were considered short-term solutions that could make the patients dependent on appointments at the pain clinic in addition to limiting their life and coping ability. Most studies refer to pain reduction as the main outcome measure, while improvement in quality of life, daily functioning, and well-being as potentially equally important treatment gains appears to be neglected [14]. On the one hand, facilitating active strategies such as cognitive therapy and self-management, pain reduction associated with opioid therapy or blockades may be provided for a limited period [24]. On the other hand, any unimodal use of biomedical strategies runs the risk of distracting the patients from active self-management [9]. Current research highlights the limitations and pitfalls of opioid pharmacotherapy for chronic pain and the importance of identifying alternatives [22,25,26]. An area for future attention where nurses can have a significant impact is to utilize the focus on the diverse non-opioid pain management strategies such as non-opioid analgesics, physical activity or psychological therapy to combat the current medical dilemma related to opioid abuse [27].

Our findings highlight the need for psychosocial treatment, as the RNs experienced most success from psychosocial approaches in pain management. A recent review emphasized the importance of psychological factors for positive treatment outcomes in pain rehabilitation [28]. Furthermore, ignoring psychosocial-existential factors can hinder progression in rehabilitation as well as recovery [29]. The whole-person model of care recognizes the importance of biopsychosocial-existential factors in both the causation and management of chronic pain [9]. Psychosocial treatments such as pain education programs or courses in coping, mindfulness, or individual cognitive therapy might provide patients with mental tools, which could strengthen their coping ability and thereby address their psychosocial issues in a better way [12]. This implies the importance of a whole-person care approach, in which interdisciplinary teamwork seems fundamental.

Our findings indicate that bringing different health care professions together could result in outcomes that were more than team-members could offer to patients when working individually. This is in line with previous studies, where specialized clinics providing interdisciplinary care have strong support for efficacy,

the gold standard of pain management [13,30,31]. However, turning a whole-person model of care into practical application is not straightforward. Our findings demonstrate that different health care professionals can have different theoretical understandings and approaches toward chronic pain management. The RNs considered a whole-person care approach to chronic pain management as cardinal but noted that the remaining members of the team had to change their mind-set quite considerably in this respect. Neglecting collaborative interprofessional practice with more of a “siloeed” approach, instead of a seamless health care approach, can leave many therapeutic opportunities untapped [9,12]. We emphasize the importance of ensuring a common theoretical perspective and approach to chronic pain management among all team members to provide efficient interdisciplinary pain care.

Several barriers to interdisciplinary care, such as being resource- and time-intensive, were described by the RNs. They found it difficult for all team members to prioritize time for interdisciplinary meetings because of busy time schedules. In addition, the lack of available offices as well as health care professionals in the team working in downsized positions presented obstacles. Previous studies have documented the treatment- and cost-effectiveness of interdisciplinary pain management programs [31]. In addition, it has been shown that interdisciplinary pain programs outperform standard medical pain services and multidisciplinary programs [32]. Creating an interdisciplinary service can be difficult compared with the ease of co-located different health care professionals within one clinic, but without a common theoretical and clinical approach to pain management. However, once established, these interdisciplinary programs greatly enhance the effectiveness of treatments for patients with chronic pain [12,31,32]. While acknowledging a number of obstacles to efficient interdisciplinary care, we emphasize the untiring efforts of RNs to develop efficient interdisciplinary teams to provide whole-person care at the pain clinics.

Limitations and future research:

Pain clinics from all five health regions in Norway were represented in the study. However, omission of six pain clinics may be a limitation, as the pain clinics that did not respond to the request and reminder may have valuable experiences that differ from those of the 10 included clinics.

The inclusion only of RNs from the interdisciplinary team may have affected the findings, despite their key role in comprehensive patient contact and collaboration with other health care professionals. Future research should include other members of the team to paint a more complete picture of the kind of pain care provided at pain clinics. Furthermore, most of the participants specialized in anesthesia, because most of Norway's pain clinics operate under the auspices of hospital anesthesia departments. It will therefore be worthwhile for future studies to investigate how RNs' advanced education affects their understanding of multifaceted and interdisciplinary care. In addition, only female RNs participated in the study. We still do not know whether or not the inclusion of male RNs would have influenced our findings. Future studies are recommended.

5. Conclusions

Our findings provide valuable insights on how RNs experience the health care offered at pain clinics. Fighting for an optimal allocation of limited resources was experienced as challenging, especially the dilemma between dealing with new and existing patients. The needs for multifaceted and integrated treatments in

chronic pain management were obvious, although this approach appeared to be too demanding of resources and time. Stronger and more flexible cooperation between pain clinics in specialist care settings and health care providers in primary care settings to ensure better patient flow and treatment is required. In addition, there is a need for an increased focus on coherent theoretical approaches to pain management within the team in the pain clinics to bridge the gap between available knowledge and clinical practice in terms of whole person care.

Acknowledgments

The authors express special thanks to the RNs who volunteered to participate in the study for sharing their experience and knowledge with us.

Conflicts of interest

No conflict of interest is declared by the authors

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ijnss.2019.03.005>.

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