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Postoperative Pain Among Patients Undergoing Open-heart Surgery

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<p>The purpose of this thesis was to describe the pain intensity and the type of pain experienced by patients who have undergone an open-heart surgery. This knowledge could be used when assessing and treating pain.</p> <p>This thesis is a part of a multinational study, which aims to describe the factors behind chronification of acute pain. Patients participating in the study were interviewed for this thesis. Background about pain, pain management and assessment as well as open-heart surgery was searched from different databases. Previous research was used to explain the results of this thesis. In addition, the results of this thesis were compared to previous research as well as to common knowledge of postoperative pain and its management.</p> <p>All the participants were over the age of 18, spoke fluent Finnish and underwent an elective open-heart surgery. The interviews took place on the first and third postoperative days.</p> <p>In general, the participants were more in pain on the first postoperative day. The pain mostly prevented the participants from moving in the bed, taking a deep breath or sleeping. The least affect the pain had on participating in physiotherapy. Most of the respondents described the pain resembling an electric shock or prickling sensation.</p> <p>On the third postoperative day, the respondents felt their overall situation had gotten considerably better compared to the first postoperative day. The biggest change was considered to be participating in physiotherapy while the least change was experienced with deep breathing and the average pain intensity. On the first postoperative day, the respondents were quite sure they would cope with the pain and the feelings related to that. By the third postoperative day almost all of the respondents felt less sure about coping with the pain.</p> <p>Despite the intensive postoperative pain, all of the respondents were very satisfied with the pain relief they had received and did not feel the need to have more analgesia. Around 50% of the respondents had received information about different pain management methods.</p>	
Keywords	Pain, Postoperative pain, Sternotomy, Open-heart surgery, Pain management, Cardiac surgery

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<p>Tämän opinnäytetyön tarkoituksena oli selvittää avosydänleikkauksessa olleiden potilaiden postoperatiivista kipua. Lisäksi, pyrittiin selvittämään millaista kipua potilaat kokevat. Tätä tietoa voitaisiin käyttää potilaiden kivun arvioinnissa ja hoitamisessa.</p> <p>Tämä opinnäytetyö on osa monikansallista kipututkimusta, missä pyritään selvittämään akuutin kivun kroonistumiseen johtavia tekijöitä. Opinnäytetyö toteutettiin haastattelemalla tutkimukseen osallistuvia potilaita. Taustatietoa kivusta, kivun hoidosta ja arvioimisesta sekä avosydänleikkauksesta etsittiin eri tietokannoista. Aiempia tutkimustuloksia hyödynnettiin muun muassa selittämään opinnäytetyössä saatuja tuloksia. Tämän lisäksi tässä työssä kerättyä tietoa verrattiin aiempiin tutkimustuloksiin sekä yleiseen käsitykseen postoperatiivisesta kivusta ja sen hoidosta.</p> <p>Kaikki haastateltavat olivat täysi-ikäisiä, suomea hyvin puhuvia ja olivat olleet elektiivisessä avosydänleikkauksessa. Haastattelut tapahtuivat ensimmäisenä ja kolmantena leikkauksen jälkeisenä päivänä.</p> <p>Yleisesti vastaajat olivat kipeämpiä ensimmäisenä postoperatiivisena päivänä. Eniten kipu vaikeutti tai esti potilaita liikkumasta sängystä, hengittämästä syvään tai nukkumasta. Vähiten kipu vaikutti osallistumasta fysioterapiaan. Suurin osa vastaajista kuvaili kivun olevan sähköiskumaista tai pistelevää.</p> <p>Kolmantena postoperatiivisena päivänä vastaajat kokivat kokonaistilanteensa parantuneen huomattavasti ensimmäiseen päivään verrattuna. Suurin muutos koettiin fysioterapiaan osallistumisessa ja vähiten muutosta tapahtui syvään hengityksessä sekä kivun keskimääräisessä voimakkuudessa. Ensimmäisenä postoperatiivisena päivänä vastaajat olivat hyvin varmoja pystyvänsä kestämään ja vaikuttamaan leikkauksen jälkeisen kivun aiheuttamia erilaisia rajoituksia ja tunteuksia. Kolmanteen postoperatiiviseen päivään mennessä lähes kaikki vastaajat kokivat olevansa vähemmän varmoja samoista väittämistä.</p> <p>Kovista postoperatiivisista kivuista huolimatta, kaikki vastaajat olivat erittäin tyytyväisiä saamaansa kivunhoitoon, eivätkä kokeneet tarvetta enemmälle kivun lievitykselle. Noin 50% vastaajista oli saanut tietoa eri kivun menetelmistä.</p>	
Avainsanat	Kipu, Leikkauksen jälkeinen kipu, Sternotomia, Avosydän leikkaus, Kivun lievitys, Sydän leikkaus

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1 Introduction

A median sternotomy is a thoracic incision used commonly in cardiac surgeries. A saw is used to split the sternum, once this is done the divided parts are retracted to allow access to the site of operation. Sternotomy closure happens by sealing the sternum with steel wires and the pectoral fascia as well as the subcutaneous tissue are closed with the surgeons preferred sutures. (Shields 2009: 397.)

Although advantages of median sternotomies are speed, exposure and its familiarity to surgeons (Shields 2009:387), postoperative chest pain is common (Costa et al: 2015: 555-556). It has been found that 80% of all participating patients experienced acute pain after surgery (Apfelbaum, Chen, Mehta & Gan 2003: 538). Patients after cardiac surgery describe the pain as aching, sharp, throbbing, stabbing, burning, sore and tender. Patients also mention feeling of breathlessness and fatigue. (Zencir & Eser 2016: 402.) Postoperative sternotomy pain is the highest during the first postoperative day and reduces on the third (Muller et al: 2000: 572). Furthermore, the occurrence of chronic postoperative pain has been seen to affect patient's quality of life and working ability (Costa et al: 2015: 555-556).

The pain as well as the severity of the pain that patients experience after cardiac surgery may interfere with activity. A study analyzed pain interference of 70 participants that underwent open-heart surgery. They found that the pain restricted general activity, walking ability, sleep, deep breathing and coughing exercises as well mood, relationships with other people and the enjoyment of life (Ögüt & Sucu Dag, 2018: 762). Similarly, a study found that interference with sleep and delimitation of daily activity i.e. vacuuming and driving a car were two major consequences of pain (Leegaard, Nåden & Fagermoen, 2008: 480).

The Innovative Medicines Initiative (IMI) pain care project is a European Union funded study, which focuses on improving management of postoperative pain, both acute and chronic, and seeks to help individualize pain treatment. The IMI pain care project's target is to learn how to assess acute pain, distinguish factors that cause the chronification of pain and find solutions on how to prevent them. (Kalso 2019: 1.) In Finland, the project is carried out by HUS Kipuklinikka (Helsingin ja Uudenmaan Sairaanhoidopiiri) and this thesis work is done in cooperation with them. The purpose was to describe postoperative pain among patients undergoing cardiac surgery. In 2017 there were 1 166 elective cardiological surgeries done in the HUCH (Helsinki University Central Hospital) Meilahti hospital, part of these operations were open-

heart surgeries (Salminen 2017: 5). The participants selected for the IMI pain care project are elective open-heart surgery patients (Kalso 2019: 3) and hence the focus of this thesis work is in patients undergoing elective open-heart surgery.

2 Background

2.1 Prevalence of pain after cardiac surgery

Around 70% of thoracic surgery patients experience severe postoperative pain which can last several months. It was found that, 50% of the patients were pain free when returning home, 37% suffered from pain up to three months after leaving the hospital and 3% of the patients experienced pain longer than six months after discharge. (Kalso, Perttunen & Kaasinen, 1992: 96-98.)

It is reported that 35% of patients who underwent cardiac surgery still had thoracic pain one year after the surgery. 70% of these patients had severe pain, 4 or higher measured on a numeric rating scale from 0 to 10. (van Gulik et al., 2011: 1311.)

Patients (n=416) experienced pain in different ways. The results suggested that postoperative pain is related to gender and age. According to the study, women over the age of 65 years consistently reported higher ratings for pain than men at the same age range. In addition, all the women (n=94) in the study stated the pain hindering them from activities of daily living more than men did. (Bjørness et al., 2016: 3062.)

2.2 Characteristics, risk factors and reasons of pain

Most commonly the pain that is experienced after sternotomy is located on and around the surgical incision. A study found that, participants felt numbness, soreness and a tightening sensation from the sternal wound (Leegaard, Nåden & Fagermoen, 2008: 479-480). Correspondingly, another study found that patients described the pain frequently as achy and some as a stinging or a throbbing sensation (Ögüt & Sucu Dag, 2018: 761). In addition to pain located around the surgical incision Leegaard et al. found that sternotomy patients experience muscular aching in the back, neck and shoulders (Leegaard, Nåden & Fagermoen, 2008: 479). The severity of pain is individual to each patient. Nevertheless, a study found that coughing

increased postoperative pain after sternotomy procedure in 70% of its participants. Other factors that increased pain were moving, deep breathing and physical exercise (Ögüt & Sucu Dag, 2018: 761).

Sternotomy surgery is a very painful operation, the main reasons being the positioning of the patient during surgery and the sternal retraction. Nerves in the upper extremities of the patient can be injured when the patient is positioned on the operating table. When performing a coronary artery bypass grafting surgery (CABG), the internal mammary artery is harvested which may lead to soft tissue and nerve injuries. In addition, during the CABG surgery a graft is made from the saphenous vein, causing pain around the incision in the leg as well. (Leegaard, Nåden & Fagermoen, 2008: 477.)

The sternal retractor might cause fractured ribs, dislocations and chest wall pain, also known as costochondritis. In addition to the sternal retraction, the persistent pain is often caused by the trauma to the muscles, bones, tendons and ligaments. (Cogan, 2010: 202.)

According to a research some of the risk factors behind persistent post-operative pain after a thoracic surgery include anxiety, preoperative pain, younger age, unmanaged acute pain following the surgery as well as the need for more postoperative analgesia. In addition, they found that a gender has a role in the complications after surgery and the length of the hospital stay. (Bjørness et al., 2016: 3059.)

Similarly, another research found that younger age, the duration as well as the location of the surgery and the ethnic background of the patients were risk factors for acute pain after cardiac surgery. The research states that those patients that have high levels of acute pain after surgery have a higher likelihood to suffer from chronic pain. Moreover, the research listed that psychological vulnerability, depression, stress, female gender, race, low education and a long-lasting surgery were additional risk factors for chronic pain after cardiac surgery. (Cogan, 2010:202.)

2.3 Pain assessment and pain management

The most used postoperative pain assessment tools are Numerical Rating Scale (NRS), Visual Analog Scale (VAS), Verbal Rating Scale (VRS) and Pain drawing. In NRS, patients are asked to say or point at a number that best fits their current feeling of pain. The scale can be 0-10, 0-20 or 0-100, where 0 represents no pain and the highest number extreme pain. The

VAS can be a straight line with two end points that represent the different limits of pain. One end may be 'no pain at all' the other can be 'pain as bad as it could be'. In VRS, the patients express their pain intensity by choosing the adjective that best describes the level of pain. In pain drawing, the patient is asked to mark or shade in the areas of pain on an outline of a human figure. In addition, sometimes patients are asked to indicate different types of pain (e.g. burning, electrifying, etc.) by drawing different symbols. (Haefeli & Elfering 2006: 18-20.)

Traditionally, pain has been treated with analgesia such as opioids or anti-inflammatory drugs. Side effects of these methods, such as nausea, vomiting, urinary retention and respiratory depression are common amongst patients. Researchers have found, that 0.5% bupivacaine infusion effectively reduces pain and opioid use after surgery. In addition, the use of general anesthesia together with epidural, subarachnoid anesthesia and analgesia during the surgery, can provide an adequate postoperative pain relief. (Huang & Sakata, 2014: 398-399.)

As for nonpharmacological method, cold packs have been found to have a significant impact on postoperative pain among sternotomy patients. The cold pack is efficient when applied over the incision line for 20 minutes at a time. However, it has been shown that doing breathing exercises, does not relieve any pain, but is in fact extremely painful for the patient. (Zencir & Eser, 2016: 404-407.)

According to studies conducted about gender related differences in postoperative pain management, women are more likely to use nonpharmacological techniques to manage their pain compared to men. These techniques include heat pads, distraction methods, relaxing and moderating activity levels (Leegaard, Nåden & Fagermoen, 2008: 482). Women are more hesitant than men to take analgesia (Bjørness et al., 2016: 3064) and some even prefer pain over taking too much pain medication (Leegaard, Nåden & Fagermoen, 2008: 482).

Managing postoperative pain is important, seeing as insufficient management can lead to complications, longer hospital stays or increases in the readmission rates. The complications include delays in the mobilization, respiratory infections and other pulmonary problems, thromboembolic complications and chronic pain. (Ögüt & Dag, 2019: 758.)

3 Purpose, aim and study question

The purpose of this thesis was to describe postoperative pain among patients undergoing open-heart surgery. The aim is to use this knowledge when developing pain management after an open-heart surgery. The study question is what kind of pain do patients experience after an open-heart surgery?

4 Data collection method, data collection and data analysis

4.1 Data collection method

The data was collected by interviewing the participants by using a structured questionnaire which was provided by the IMI project. The first postoperative day questionnaire consisted of 62 questions that were divided into 12 dimensions. In this work seven dimensions are reported: pain intensity, how much pain hindered daily tasks, pain characteristics, pain control, effects of the pain, mobilization after surgery and pain relief. The third post-operative day questionnaire had 53 questions divided into 10 dimensions of which seven dimensions are reported here: pain intensity, how much pain hindered daily tasks, pain symptoms, pain control, effects of the pain, mobilization after surgery and pain relief. The respondents had the option to complete the questionnaire independently online through their emails as well.

Two types of scales were used in the questionnaires. First was a continuous variable. A scale from 0% to 100%, was used on the questionnaire. For the purpose of making it more clear and easier to understand, the scale from 0 to 10 was used when presenting the question to the participants. The other type of scale was a dichotomy variable, where the options were yes/no or had/had not. In addition, the Likert-type scale was used only on the third postoperative day, because the questions involved comparing the first and the third postoperative days.

A questionnaire is an advantageous data collection method because it is relatively efficient. Vast amounts of data can be collected quickly and at low cost. A questionnaire is also generalizable because interviewer bias is avoided and can provide the respondents anonymity. (Nurse Researcher 2009.)

4.2 Data collection

Participants were selected from the patients undergoing an open-heart surgery. There were criteria set as for who is eligible to take part in the study. These criteria were set by the IMI project. The eligible patients were over 18 years old; they had given their informed consent to participate in the study, the surgery was elective, the first meeting with the patients had happened before the surgery and the patients were planned to stay in the hospital after the surgery. The exclusion criteria included cognitive impairment and language barriers such as the patient not being fluent in Finnish. (Kalso 2019: 1.)

The data was collected from patients on their first and third post-operative day. Most participants had been transferred to a post-operative ward by then and hence the interviews were conducted in their designated rooms. The data collection started in the spring of 2020 and the number of participants and interviews got confirmed by then.

4.3 Data analysis

The data collected in this study was quantitative and therefore descriptive statistical data analysis methods were used. All the data collected through the questionnaires is not reported in this study because the focus is on the data relevant to nursing practice. The data collected was entered and analyzed on the Statistical Package for Social Sciences (IBM SPSS version 25). Descriptive statistics like the range, mean, standard deviation (SD) as well as frequencies were used to describe the results.

5 Results

5.1 Description of the participants

The average age of the participants was 65-70 years. The youngest participant was 21 years and the oldest was 78 years. The sample consisted of both men and women. All participants underwent an elective open-heart surgery. The total number of data collected on the first post-operative day was from 6 patients and data was collected from 12 patients during their third postoperative day.

5.2 Pain intensity

On the first postoperative day the patients rated their experience of the worst pain an average of 7,7. The pain was the highest during physiotherapy and the lowest while resting. On the third postoperative day patients rated the worst pain an average of 5,8. Patients experienced the least pain while resting. (Table 1).

Table 1. Pain intensity on the 1. postoperative day (n=6) and 3. (n=9-12) postoperative day
(0 = no pain, 10 = worst possible pain)

Statement	1. Postoperative day				3. Postoperative day			
	min	max	mean	SD	min	max	mean	SD
How intense is the pain...								
While resting	0	5	2,7	1,6	0	5	2,3	2,1
When deep breathing	3	6	4,5	1,0	0	7	3,8	2,1
During physiotherapy	6	8	6,7	0,8	0	8	3,8	3,0
On average in 24 hours	2	5	4,2	1,3	2	5	4,0	1,4
At worst in 24 hours	7	9	7,7	0,8	1	9	5,8	2,8

The average pain intensity in the last 24 hours was inquired two times, results from repeated question were as followed; patients on the first postoperative day (n=6) rated the average pain in the last 24 hours a mean of 3,7 (range 2 - 5). On the third postoperative day (n=12) mean was 4,0 (range 2 - 7).

5.3 Pain hindered daily activities

Participants reported that pain prevents them from moving in the bed on an average of 7,6 on the first postoperative day and a mean of 5,3 on the third postoperative day. The pain wasn't considered to have a big impact on deep breathing. On the first postoperative day the average was 5,8 and on the third it was 3,4. The pain did not hinder participating in physiotherapy, results were an average of 3,2 on the first and 1,5 on the third postoperative day (Table 2).

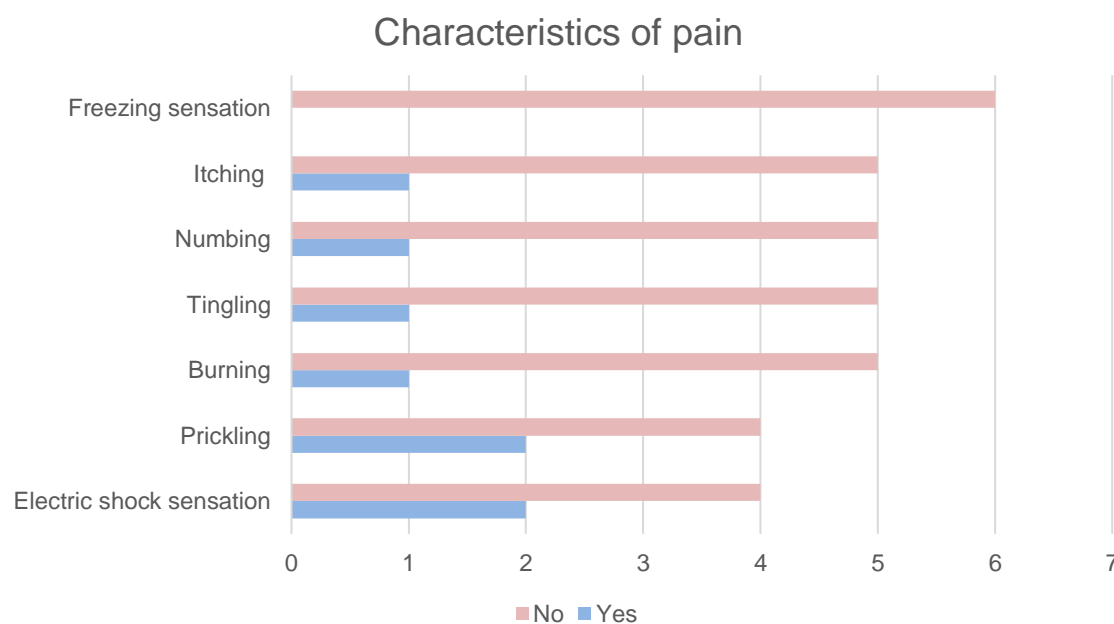
Table 2. Pain hindering daily activities on the 1. Postoperative day (n=5) and on the 3. Postoperative day (n=10-12). (0= did not hinder, 10= hindered totally)

Statement	1. Postoperative day				3. Postoperative day			
	min	max	mean	SD	min	max	mean	SD
Movement in bed	4	10	7,6	2,3	2	8	5,3	2,2
Deep breathing	2	8	5,8	2,4	0	7	3,4	2,7
Participating in physiotherapy	0	6	3,2	3,0	0	4	1,5	1,7

5.4 Pain characteristics and symptoms

Patients were asked whether the pain had one or more of the following characteristics. Most commonly, pain was described as an electric shock and prickling sensation (n=2). No patients described the pain as a freezing sensation. (Table 3.)

Table 3. Characteristics to describe pain (n=6)



When comparing the pain patients felt on the third postoperative day to the first postoperative day, there was an improved change overall in all questioned aspects. The change in pain

intensity during physiotherapy improved the most. While pain intensity when taking a deep breath as well as the average pain during the last 24 hours had the least change. (Table 4.)

Table 4. Change in pain when comparing the 3. postoperative day to the 1. postoperative day (n=7-12) (1 = Very much improved, 7= Very much deteriorated)

Statement	3. postoperative day			
Compared to the 1.POD how much change has there been in...	min	max	mean	SD
Pain intensity while resting	1	5	2,5	1,0
Pain intensity while taking a deep breath	1	5	2,8	1,1
Pain intensity during physiotherapy	1	4	2,2	1,0
Average pain during the last 24 hours	1	5	2,8	1,2
Worst pain during the last 24 hours	1	4	2,7	1,0
Activity during pain	1	5	2,4	1,4
Pains effect on physiotherapy	1	4	2,7	1,0
Pains effect on breathing	1	4	2,5	0,9

5.5 Pain control

On the first postoperative day all patients were very sure they can control pain related frustration. In addition, patients responded that they were sure that they can control the pain from hindering daily activities and mood. Similarly, patients on the third postoperative day were more certain that they could control the pain from effecting mood, daily-activities and pain related frustration. Patients on the first postoperative day were least confident that they can control the pain on its effects on sleep. Conversely, patients on the third postoperative day were least confident about the pains effect while coping with physical discomfort and fatigue. Overall, patients were less sure that they can control pain during the third postoperative day compared to the first postoperative day. (Table 5.)

Table 5. Pain control on the 1. (n=2-6) and 3. (n=7-10) postoperative day. (0= very unsure, 10= very sure)

Statement	1. Postoperative day				3. Postoperative day			
	min	max	mean	SD	min	max	mean	SD
I can...								
Alleviate my own pain	5	10	8,0	2,0	2	10	7,6	2,7
Prevent pain from interfering with sleep	2	10	8,0	3,1	3	10	7,9	2,4
Cope with physical discomfort	4	10	7,0	2,6	3	10	6,4	2,2
Regulate my activity level within pain limits	5	10	8,0	2,2	2	10	6,9	2,6
Operate despite tiredness/fatigue	5	9	6,8	2,1	2	10	6,4	2,7
Improve my mood	9	10	9,5	0,7	5	10	8,3	1,7
Control pain in daily activities	9	10	9,5	0,7	3	10	8,0	2,6
Endure pain related frustration	10	10	10,0	0,0	4	10	8,29	2,4

5.6 Effects of pain

On the first and third postoperative day, the participants evaluated the pain having a negative effect on taking a deep breath, coughing and sleeping. Patients on their first postoperative day assessed that the pain prevents them from coughing or taking a deep breath on average 6,2. On the third postoperative day the average had decreased and was 4,8. The effect on sleeping was relatively lower on both days: 3,0 on the first postoperative day but increased to a 4,0 on the third postoperative day (Table 6).

5 out of the 6 patients that were interviewed on their first postoperative day had been standing up after their surgery. Out of these participants, the majority considered that the pain does not hinder them from getting up. Participants on their third postoperative day had all been on their feet (n=12).

Table 6. Does the pain prevent patients from doing certain activities on the 1. postoperative day (n=6) and on the 3. (n=12) postoperative day? (0= did not prevent at all, 10= prevented completely)

Statement	1. Postoperative day				3. postoperative day			
	min	max	mean	SD	min	max	mean	SD
Deep breathing and coughing	4	8	6,2	1,5	0	9	4,8	2,7
Sleeping	0	8	3,0	3,7	0	9	4,0	3,1

5.7 Pain relief

Patients were asked to rate the amount of pain relief they had received. Patients rated that they had received higher amounts of pain relief on the first postoperative day compared to the third. Secondly, patients were questioned on how much they participated in the decision-making regarding pain relief. Patients on the first postoperative day all answered that they had very much influence on the decision-making. Patients on the third postoperative day reported a lower average of 8,1. Thirdly, patients were asked to rate their satisfaction on the received pain relief after surgery. Patients were more satisfied with their pain relief on the first postoperative day compared to the third. (Table. 7)

Table 7. Patients perspective on pain relief on their 1. postoperative day (n=5-6) and 3. (n=10-12) postoperative pain. (0 = no relief/none/extremely unsatisfied, 10 = total relief/very much/very satisfied)

Statement	1. Postoperative day				3. postoperative day			
	min	max	mean	SD	min	max	mean	SD
Pain relief								
Amount	5	10	8,5	2,0	3	10	7,9	2,1
Decision making	10	10	10,0	0,0	0	10	8,1	3,2
Satisfaction	8	10	9,3	0,8	7	10	9,0	1,1

In addition, patients were asked on the 1. (n=6) and 3. (n=12) postoperative day if they would have wanted more pain relief than what they had received. All patients reported that they did not want more pain relief. Furthermore, patients were asked if they had received information about pain relief options. On the first postoperative day (n=4) 50% of the patients reported that

they had received information about pain relief options. Moreover, patients on the third postoperative day (n=7) four reported that they had received information and three reported that they had not.

6 Discussion

6.1 Discussion of the results

Pain experiences are always subjective, and everyone expresses pain differently. Whenever patients are asked to describe their pain or to rate it on a scale, they are often comparing their current pain experience to previous ones. If the patient has been in surgery before, they may be more prepared for the postoperative pain and hence be in less pain. This can be the case especially when the patient has already had an open-heart surgery before, since they have greater knowledge on what to expect regarding the length, the type, and the intensity of the pain. However, we should consider that this does not mean that all patients that have underwent an open-heard surgery before are in less pain than those who are in the surgery for the first time.

The results present that characterizing pain is individual to each patient. The characteristics asked in the questionnaire terms like burning, freezing, tingling, are just a small number of that could be used to describe pain and the pain sensation. The results showed that only a few patients expressed their pain as one or more of the questioned characteristics. This begs to question, what could be the correct terms to characterize pain and is there a possibility that there are no certain words to express what type of feeling postoperative pain is.

Participants were found to be in less pain on their third postoperative day compared to their first, excluding the effect on sleeping which did worsen on the third postoperative day. This contradicts previous knowledge which has shown that patients are typically in more pain during the third day after surgery than the first. Previous knowledge suggests that the reason behind this is that on the first postoperative day they are still under heavy medication and anesthesia. However, this study did find that patients were less sure that they can control pain during the third postoperative day compared to the first postoperative day. The results also suggest that patients have a harder time controlling pain from affecting physiological factors like regulating activity level and coping with physical discomfort compared to psychological factors like mood and pain related frustration.

Physiotherapy after surgery is important because it can limit postoperative complications. Physiotherapy is often begun on the day of the surgery or the first postoperative day; this depends on the type, length and site of operation. Physiotherapy is one of the most painful activities among patients that have undergone an open-heart surgery. The results reported that patients described their pain during physiotherapy to be 6,7 on the first day and 3,8 on the third postoperative day. The results support previous knowledge and found that patients on the first postoperative day were in fact quite painful during physiotherapy. Despite being in pain, participants did not consider that the pain prevents them from participating in physiotherapy.

The average pain intensity was asked two times, once in the beginning and once in the end of the questionnaire. The average pain intensity average matched on the third postoperative day were pain intensity was rated on average 4,0. However there was a discrepancy on the first postoperative day, in the beginning of the questionnaire patients rated the pain intensity an average of 4,2 and the second time the pain average decreased to 3,7. Though the change is relatively small some reasons behind this may be that patients either had time during the questionnaire to process the pain more or had an opportunity to think about something else than the pain they were experiencing.

The results found that many of the patients were satisfied with the amount of pain relief they had received after surgery. Patients on the first postoperative day were more satisfied with the amount of pain relief compared to patients on the third postoperative day. Possible reasons for this may be that patients on the first postoperative day still had trace amounts of the analgesia given during surgery in effect. Moreover, there may be a possibility that nurses pay more attention to the patients pain during the first postoperative day and are more frequent to administer pain relief. It's important to note that the results express that not all patients had been informed about pain relief options. It can be considered that there are cultural factors linked to this. This may suggest that in Finland, patients are more likely to be administered pain medication for pain relief rather than receiving information about non-medical pain relief options.

6.2 Ethical considerations

Ethical considerations in research are consent, research procedures, open and honest reporting, researchers and recruitment. Consent should be voluntary and fair, and participants have the right to withdraw at any time during the study. Every participant should have all the information about the study, the risks and the benefits. The research procedure should keep all

data confidential, avoid deception and minimize any physical or mental harm. (Connely 2014: 54-55.)

Permission for the project exists and we abided by confidentiality and non-disclosure throughout. The study consisted of patients that had given their written informed consent. Participation in the study was voluntary and the patients could withdraw from it at any time. The study did not contain intervention therefore, participants are not exposed to additional mental and emotional risks. Health related factors contributing to the patient not continuing with the study were considered, such as complications in the operation, prolonged stay in intensive care and unwillingness to answer to the questionnaire due to nausea or pain. Often on the first postoperative day patients were extremely tired and were still recovering from the anaesthesia. Before and during the questionnaire patients were informed that they can take a break or decide not to answer at any time. Questions that we found that may have been hard to understand or complicated were not asked if the patient was noticeably tired or in pain.

To protect patient's anonymity and data protection, all the data that was collected was submitted to an electronic system. If data was collected via paper questionnaire, they were safely stored at the Pain Clinic. In most cases, patients were in a patient room with other patients present, therefore anonymity may have been risked. If possible, patients were given the choice to fill out the questionnaire by hand or asked if they minded that the interview took place while others were present.

6.3 Validity

Validity can be roughly divided into two categories, internal and external validity. Internal validity focuses on the outcomes of the study and ensures that they are valid whereas external validity assesses how well the results can be applied to other situations and people as well as seeing that the conditions of the study are representative to the time and situation. (Roberts et al. 2006: 43.)

Two theses were made on this topic and the data was collected according to an agreed schedule. The theses do not share the same data; therefore, each study has a different number of participants which means that there is a possibility for conflicting results. Close to the end of the data collection, the COVID19 pandemic forced to stop the interviews, which meant a fewer number of participants on behalf of this thesis. The purpose of this thesis was to understand how patients describe postoperative pain following an open-heart surgery. The data was not

meant to be generalized; therefore, the low number of participants does not risk the validity of the results in this thesis.

The questionnaire provided has been validated by the researchers in the IMI pain care project. The project is international, and the data collection will be ongoing for three years. The questionnaire was translated in Finnish by a non-Finnish speaker, which led to long and somewhat difficult sentence structures. Some of the questions on the questionnaire were quite difficult for the participants to understand. One example is when asked from the participants about getting physiotherapy not everyone knew that it also meant getting up on their feet or sitting on the edge of the bed. In addition, the different scales were especially difficult for the participant on the first postoperative day as the participants were still heavily medicated and quite tired. On the third postoperative day, the comparison scale produced considerable amount of difficulties and confusion.

Another aspect to consider is the interviewers influence on the participants and their answers. This can be for example leading the participant's answer by explaining the question. It might also be that the participant is not completely honest when answering because they have to tell their answer out loud.

7 Conclusion

The study provides knowledge about how patients describe postoperative pain after an open-heart surgery as well as factors that may increase pain and effect the pain experience on the first and third postoperative day. Therefore, the results from this study can be utilized in clinical nursing practice when assessing and developing pain management among patients undergoing open-heart surgery.

More knowledge and research are needed on different postoperative pain management options. In addition to this, methods to inform patients about pain management options should be greatly improved. The results of this study indicated that only 50% of the participants on the first postoperative day and less than 60% on the third postoperative day had been given information about different pain management options. Its imperative that nurses inform patients about alternative ways to manage pain, whether it's telling the patient about different types of analgesia or nonpharmacological methods. Previous studies have shown, that especially women prefer nonpharmacological pain management methods over taking analgesia

and might even suffer from the pain rather than taking pain medication (Leegaard, Nåden & Fagermoen, 2008). Moreover, when considering how patients are given information about different pain management options it would be wise to give the information also in written form, such as leaflets. This would aid patients in understanding and remembering the information.

Contrary to the results of this thesis, previous knowledge has shown that patients experience more pain on third postoperative day. On the first postoperative day patients are still under the analgesia given during the surgery and are given more pain medication at the wards. By the third postoperative day, the effect of the anesthesia and analgesia given during the surgery has stopped, making the patients more painful. However, all patients are different as well as all surgeries are different, and the nurses can't rely on generalized information when giving pain medication. The patients must be assessed before and after pain management, and it is good practice to ask what kind of pain the patient is experiencing and where, not just the intensity of the pain.

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