PAIN AFTER CESAREAN
A Pilot Study Assessing Pain and Health-Related Quality of Life in Women After Cesarean Section

By
Elizabeth Gayle Subocz

A thesis submitted to the School of Nursing in conformity with the requirements for the degree of Master of Science

Queen’s University
Kingston, Ontario, Canada
September 2007

Copyright © Elizabeth Gayle Subocz, 2007
Abstract

Purpose: This thesis addresses feasibility issues of conducting a descriptive study of pain and health-related quality of life (HRQOL) in women after Cesarean section (c-section).

Objectives: Feasibility issues surrounding population access, chart completeness for review, and preference for online data collection were investigated. Prevalence and prediction of postoperative pain and HRQOL at six-weeks was addressed to generate hypotheses for future study.

Methods: A descriptive pilot design was used, collecting a convenience sample of 41 women recruited two hours prior to a planned c-section at Kingston General Hospital. Consenting women completed preoperative questionnaires via computerized tablet or paper and pen. Preoperative data included pain, HRQOL, anxiety, depression, somatization, HCU, and demographics. Six weeks postoperatively, women completed pain, HRQOL, and HCU questionnaires through the internet, postal mail, or telephone. A chart review was used to collect health and obstetrical history, and acute postoperative pain.

Results: An average of two participants per week were recruited, with a participation rate of 83.7%. Online questionnaires were preferred by 34 women (83%) preoperatively, and 15 women (48.4%) postoperatively. Almost 40% of patient charts were incomplete, missing symptoms reported in the immediate postoperative period. Twenty-four percent of the sample was lost to follow-up.

Mild postoperative pain was reported by seven women (23%) within 24 hours of completing the questionnaire. Bodily pain and the physical component of HRQOL were worse both pre- and post-operatively than age- and sex-matched norms. Postoperative
pain at six weeks was predicted by tubal ligation, pain expectancy, and severe postoperative acute pain. Postoperative HRQOL scores were correlated with preoperative HRQOL score, depression, somatization, and preoperative pain. HRQOL physical composite score, bodily pain scores, and trait anxiety were predictive of healthcare use.

**Conclusion:** The planned c-section population is accessible for research purposes, however timing and mode of follow-up should be carefully considered due to the demands of newborn care. A larger study evaluating the prevalence of chronic pain after c-section is needed, in which the role of depression, anxiety, somatization, and pain expectancy in pain outcomes and the impact on healthcare use is investigated.
Acknowledgements

I would like to thank Dr. Elizabeth Van Den Kerkhof for both her academic guidance and encouragement throughout this process. She made my dream of studying chronic non-malignant pain possible, giving me both support and independence in my work.

I would also like to acknowledge my committee members, Dr. Ray Viola and Dr. Margaret Harrison, for their valuable direction and assistance in this thesis.

I am grateful to James Medd for mentoring me in data collection and supporting me through data analysis. Similarly, I am grateful for Wilma Hopman and her guidance and help with the statistical analysis and Blaine Jenkins for his work creating the online database. I would also like to thank Helen Campbell and Anne Henderson for their help with the details of paperwork and protocol.

I would like to acknowledge the Queen’s University/Ontario Graduate Scholarship in Science and Technology, Queen’s Graduate Award, Frieda Paltiel Fund, and the Faculty Award for Graduate Students in Nursing for their financial support throughout this thesis.

Finally, I would like to thank my fiancé Stephen Mann and my family for their prayers and support through this process.
Table of Contents

Abstract .............................................................................................................. ii
Acknowledgements .................................................................................. iv

Chapter One: General Introduction

Introduction, Organization, and Background .................. 1
Research Questions ............................................................ 7
Contribution of Knowledge .............................................. 9

Chapter Two: Literature Review

Introduction ................................................................. 10
Method .............................................................................. 11
Review ............................................................................. 12
Conclusion ....................................................................... 25

Chapter Three: Methods

Design and Framework ...................................................... 27
Sample ................................................................................. 30
Procedure ........................................................................... 31
Instruments and Definitions .............................................. 33
Analysis .............................................................................. 37
Ethics .................................................................................. 41

Chapter Four: Feasibility Results and Discussion

Accessibility ....................................................................... 44
Chart Review ........................................................................ 47
Online Data Collection ................................................................. 49
Issues with Study Implementation ........................................... 52

Chapter Five: Manuscript: A Pilot Study Assessing Pain, Health-
Related Quality of Life and Healthcare Use after Cesarean Section

Summary .................................................................................. 57

Structured Abstract .................................................................. 58

Introduction ............................................................................. 60

Materials and Methods ............................................................ 64

Results ...................................................................................... 71

Discussion ................................................................................ 75

References ................................................................................ 79

Chapter Six: Summary and Implications for Future Research

Overview of Findings ............................................................... 96

Strengths and Limitations ......................................................... 99

Nursing Implications ............................................................... 100

Conclusions and Recommendations ................................... 101

References ............................................................................. 103

Appendices

Appendix A Conceptual Framework: Theory of
Unpleasant Symptoms ............................................................. 117

Appendix B Conceptual Framework As Applied to
Thesis Study .............................................................................. 118

Appendix C Chart Extraction Form ......................................... 119
List of Tables

Table 2.1 Main Results of Literature Review..............................................26
Table 3.1 Summary of Questionnaires, Score, and Their Distribution ..42
Table 4.1 Summary of Variables Most Often Missing in Reviewed
Charts ......................................................................................................54
Table 4.2 Mode of Preferred Pre- and Post-Operative Follow-up...........55
Table 5.1 Univariate Analysis of Preoperative Demographic,
Psychological, and Clinical Characteristics, Health-Related Quality of
Life, and Healthcare Use of Study Sample..............................................84
Table 5.2 Pain Pre- and Post-Operatively and Six Weeks After
Surgery .....................................................................................................88
Table 5.3 Bivariate Analysis of Independent Preoperative
Characteristics and Pain at Six Weeks After Surgery..............................90
Table 5.4 Bivariate Analysis of Characteristics Associated with
Health-Related Quality of Life Six Weeks After Surgery.......................93
Table 5.5 Postoperative Healthcare Use of Study Sample .................94
Table 5.6 Bivariate Analysis of Characteristics Associated with
Healthcare Visits Six Weeks After Surgery.............................................95
CHAPTER ONE

Introduction

Pain is what drives us to seek help with the knowledge that something is wrong. It is becoming apparent, however, that the surgical treatment received for improved health may play a role in the approximate 1.5 million Canadians reporting a pain disability (Statistics Canada, 2002). A surprisingly high number of clients attending pain clinics in Scotland and north England attributed their pain to a surgical event (Iohom & Shorten, 2003). This pain is now termed chronic post-operative pain (CPOP) and has been defined in the literature by three criteria: the pain developed after a surgical procedure, has persisted for a minimum of 2 months, and other causes of pre- and post-operative pain have been eliminated (Macrae, 2001). Other researchers have defined the timing of CPOP differently, with pain persisting for six weeks after surgery defined as chronic (Doherty, Magann, Newnham, Paech, & Verity, 2006). For the purpose of this thesis, chronic pain was operationalized as pain which remains six weeks after surgery in the absence of reported painful post-surgical complications. Although the cause and mechanism are unknown, research has highlighted possible risk factors for CPOP development, including preoperative and acute postoperative pain (Iohom & Shorten, 2003).

Approximately one in five Canadian births involved surgical intervention via cesarean section (c-section) in 2002 (Canadian Institute for Health Information, 2005). Few studies examine incidence and potential risk factors for CPOP in the obstetrical population despite the rising c-section rate, identification of CPOP after other surgeries (Bruce, Chambers, Poobalan, & Smith, 2004), and special needs of new mothers. This
thesis addresses the issues of conducting a larger study of pain and HRQOL in women before and after a planned c-section using online data collection. This chapter addresses the format of the following thesis and the study’s conceptual framework, background, objectives, and context within the larger body of knowledge and research.

Format of Thesis

This thesis follows a combined traditional and manuscript format with traditional chapters followed by a manuscript formatted to the requirements of the journal to which it will be submitted. Chapter two is a review of the literature addressing CPOP in the obstetrical population. The study methodology is outlined in chapter three, and chapter four includes the results and discussion of the feasibility components of this study. The remaining research questions and hypothesis development is addressed in the manuscript in chapter five. Finally, a general discussion of the thesis is presented in chapter six with a summary of study findings, implications for practice and future research, and strengths and limitations.

Conceptual Framework

Guiding the structure of this study is the theory of unpleasant symptoms, a middle-range nursing theory (Appendix A). This theory illustrates the interplay between physical, psychological, and situational factors and their effect on the experience of symptoms, which further affect performance, forming a feedback loop (Gift, Lenz, Milligan, Pugh, & Suppe, 1997). This study follows the framework for the relationships between the three factors, and symptoms and performance but does not address the feedback loop of the potential influence of performance on the three initial factors. See appendix B for a more detailed application of the framework to the thesis study.
Background of Thesis

Epidemiology of Chronic Post-Operative Pain

Few studies have addressed long-term pain following c-section. A literature review of acute pain after c-section reported that pain at rest is well managed with opioid analgesics. The pain induced by the necessary movement for newborn care, however, was reported to be poorly controlled with analgesics. Furthermore, the research available indicated that mismanaged acute pain may extend into chronic pain issues (Lavand’homme, 2006). Research indicates that abdominal surgery appears to put women at a high risk of postoperative chronic pain (Bisgaard, Kelet, & Rosenberg, 2005; Bransborg, Nikolaksen, Hansen, Kehlet, & Jensen, 2007; Heintz, eta al, 2005). Description of chronic pain following c-section was addressed by only one study, reporting a prevalence of 12% at a mean follow-up time of 10.2 months after surgery (Jensen, Kehlet, Nikolajsen, & Sørensen, 2004). A randomized controlled trial of magnesium sulphate to improve acute postoperative pain and pain at six weeks identified no difference between treatment groups, but reported an overall pain prevalence of 18% at six weeks (Doherty, et al, 2006).

Issues with Follow-Up

Studying this population pre- and post-cesarean may present an accessibility issue as time for follow-up may be limited by demands of newborn care. Online data collection presents a method of contacting women in their home, without the need of participants physically mailing their completed questionnaires. For the researcher, online data collection reduces the costs of postage, materials, and labour of entering data (Baernhold & Clarke, 2006; Lakeman, 2007). Research has identified potential
disadvantages, including a sample biased towards individuals with online access (Bowie, Hergenrather, & Rhodes, 2003), inactive email addresses (Baernhold & Clarke, 2006), and a potentially lower response rate (Akl, Maroun, Klocke, Montori, & Schunemann, 2005).

Brocato and Mavis (1998) conducted a review of 11 studies that compared online to postal mailed surveys and reported a better response rate with paper copies. One of the reviewed studies randomly selected 100 participants from a medical education listserv and sent out a set of questions by either postal or electronic mail. Response rates were 56% for electronic and 77% for postal mail questionnaires. The proportion of surveys returned blank or termed undeliverable were similar between groups. Time to return for postal mail questionnaires was adjusted for analysis, but time for follow-up remained significantly different between groups with electronic mail surveys returned more quickly. The review concluded that decisions of data collection mode are situation-specific.

An email based study of 131 chief nursing officers had a response rate of 35%, where electronic mail was the only mode of participation. The researchers postulated that this low response rate was due to email being directed to junk folders and erased and potential language issues due to the broad sample (Baernholdt & Clarke, 2006).

VanDenKerkhof, Parlow, Goldstein, and Milne (2004) compared the response rates of Canadian anesthesiologists who were randomized to receive a questionnaire by either postal or electronic mail. Thirty-five percent of anesthesiologists responded to the electronically mailed questionnaire as compared to the response rate of 69% in the group receiving the questionnaire by postal mail. Research emails being directed into junk
folders and inaccurate electronic mail addresses were issues of electronic questionnaires highlighted by this study.

The acceptability of using electronic, compared to paper, data collection was measured in a randomized study of preadmission clinic patients prior to their surgery. Almost all participants randomized to the study questionnaire via computer, tablet, or personal hand-held computer reported ease and preference for this method (VanDenKerkhof, Goldstein, Blaine, & Rimmer, 2005).

**Impact of Chronic Post-Operative Pain**

It is important to study the c-section population as pain and its outcomes are raising concern in Canada. A 2001 Canadian survey of work and activity limitations revealed that nearly 1.5 million Canadians reported a pain disability, including women of working age (Statistics Canada, 2002). Highlighting the affect on the healthcare system, a large survey in the United States (Chee, Lipton, Morganstein, Ricci, & Stewart, 2003) supported the finding that chronic pain is associated with seeking medical care, with frequent visits to physicians and use of multiple medications. The economic impact is also highlighted by a survey study in Europe which reported high costs due to lost productivity of employees with chronic pain (Dukes, McDermott, Rowbotham, Schaefer, & Toelle, 2006).

In addition to healthcare and economic costs, the affect of pain is felt by the individuals living with the chronic problem. In the one study of women undergoing c-section, 5.9% of women reported pain of at least moderate intensity that was still present 18 months after surgery. This pain was present both in resting and active states, and was made worse by actions such as lifting an infant or other heavy object Those respondents
who did not report pain often described uncomfortable sensations at the site of incision at a mean follow-up time of 10.2 months (Jensen, Kehlet, Nikolajsen, & Sørensen, 2004). This need to care for a newborn, in addition to analgesics being limited to those without risk of passing through breast milk, makes the obstetrical population unique with regards to their acute and chronic pain experience.

With the potential impact on the healthcare system and individual quality of life, researchers have investigated potential risk factors of poor pain outcomes for prophylactic or early intervention. Although no research was found addressing risk factors of CPOP following c-section, psychological variables have been identified in other surgical populations. Several studies have highlighted anxiety and depression as being correlated with acute postoperative pain outcomes after abdominal gynecological surgery (Allen, Brockbank, Carr & Strike, 2006; Carr, Thomas, Wilson-Barnet, 2005). Catastrophizing was also acknowledged as a potential predictor of acute postoperative pain in a small study including both men and women having elective abdominal surgery (Ferber & Granot, 2005). Thus research in other surgical populations has identified possible correlates between preoperative psychological variables and postoperative pain outcomes. Research following participants into the months following surgery is limited, with no studies found addressing predictors of long-term pain outcomes after c-section.

Context of Thesis

This study is part of a group of studies addressing pain and HRQOL outcomes in women after gynecologic, urologic, breast cancer, and c-section surgery. Investigating pain and HRQOL in women after surgery using online data collection is a common theme throughout all these studies however the research questions addressing the issues of
studying the obstetric population are unique to this thesis. Thus, the database and questionnaires are consistent across the studies, with an extended version of the chart extraction form used to collect additional obstetrical data on women having a c-section.

Research Questions

The research questions have been organized under three main headings. This pilot study also addressed an additional research question for the purpose of hypothesis-development to guide future research in this area.

Population Accessibility

1. What is the average number of women recruited per week?
2. What proportion of women scheduled for an elective c-section will consent to participate in a research study?
3. What proportion of women is lost to follow-up?

Completeness of Patient Charts

4. What proportion of hospital charts is complete for extraction of the necessary procedural and health information?

Online Data Collection:

5. What proportion of women report access to a computer to complete online questionnaires from home?
6. What proportion of women preferred online, paper, or telephone formats of the follow-up questionnaires?

Pain and Healthcare Use in this Population

7. What proportion of women report pain prior to c-section?
8. What percentage of women report pain at six weeks after c-section surgery?
9. What healthcare services do women access for pain before and after c-section?

**Hypothesis-Developing Research Question**

10. Is chronic pain six weeks after c-section associated with preoperative pain, HRQOL, depression, anxiety, somatization, healthcare use, or demographic and/or procedural details?

**Chapter Outlines**

Chapter two summarizes the literature on CPOP in women undergoing c-section and related populations, providing the background for the subsequent chapters. Key topics reviewed include CPOP in women undergoing c-section population with extension to the abdominal surgery population to supplement the few cesarean-specific studies identified. Current trends in c-sections, post-cesarean pain management techniques, HRQOL issues, economic and healthcare burden of chronic pain, and CPOP risk factors are explored.

Chapter three outlines the methodology used to address the research questions listed above. Chapter four addresses research questions one through six, presenting the results and their implications. Research questions seven through ten are addressed in chapter five’s manuscript. The study sample is described in terms of the preoperative characteristics identified as potential correlates with CPOP and results of the correlation analysis are presented for the purpose of guiding hypotheses in future studies. Finally, chapter six summarizes the study as a whole, providing strengths and limitations, implications for practice, and highlighting areas for future research.
Contribution of Knowledge

This thesis contributes to the current body of knowledge surrounding CPOP in two ways: identifying study organization issues and providing hypotheses for future study.

First, this thesis provides insight into the issues of conducting a larger, descriptive study of CPOP and HRQOL in the planned c-section population. With little research to date, accessibility, willingness to participate, and proportion of women lost to follow-up in the elective c-section population is useful for sample size calculations for a larger study.

Online data collection is a second issue addressed by this study. Online access and preference for mode of follow-up are given, helping to guide future studies’ decisions of follow-up format.

This thesis also presents preliminary data on pain and HRQOL, and their preoperative risk factors. Although not powered to identify associations between the variables, the data can be used for meta-analysis and generating hypotheses for future studies.
CHAPTER TWO

Introduction

Chronic post-operative pain (CPOP) has become a recognized phenomenon as research following participants into the months following surgery has revealed complaints of pain in the absence of a clear cause. Though various definitions have been used, CPOP has been widely defined in the literature as beginning after a surgical experience in the absence of a clear, biological cause. The exact timing of when pain is considered chronic varies throughout the literature, with some researchers defining chronic pain as persisting for six weeks (Doherty, et al, 2006) while other researchers define chronic pain as lasting for at least two months (Macrae, 2001). Although CPOP has been studied after various types of abdominal surgery, chronic pain following Cesarean section (c-section), a type of major abdominal surgery, has not been adequately addressed.

The annual number of births by c-section has increased in Canada since 1979 (Werschler, 1998) and is currently higher than that recommended by the World Health Organization (WHO) despite their cautions of the serious nature of this surgical procedure (Pan American Health Organization, 2002). The number of women affected by adverse outcomes after c-section is, therefore, both large and growing.

This review summarizes the literature on CPOP after c-section. The review begins with an overview of c-sections in Canada and pain management techniques used in this population. The literature regarding CPOP incidence and prevalence, potential predictors, and impact on the individual and the healthcare system are also presented.
With limited studies addressing CPOP after c-section, the review was expanded to include studies addressing these topics in other abdominal surgical populations.

**Method**

Both the initial search of c-section surgery and the wider search of abdominal surgery were conducted using CINHAL, EMBASE 1980 – 2007 week 05, and MEDLINE (R) 1950 – Jan. week 4 2007 databases. Studies were included if they identified postoperative pain persisting past the initial postoperative period as an outcome and studied an adult population. Studies of geriatric or paediatric postoperative pain were not included. When a study meeting these criteria was found, its references were searched and the “find similar” tool was used. Hand-searching of additional studies was conducted based on recommendations made by researchers in this field. For the initial search, the terms “chronic post-operative pain” and “Cesarean section” were searched with the latter combined with “postoperative pain,” “long-term pain,” and “chronic pain.” Keyword searches were used where the entered term did not match to an appropriate subject heading. The search included all subheadings, but limited the findings to English studies of human participants. These search terms were also combined with the terms “anxiety,” “depression,” “pain expectancy,” and “somatization” (Table 2.1). Ten studies were identified by this search. No studies addressing pain expectancy in surgical populations were identified however four studies investigating the role of pain expectancy in the experience of pain were identified and included in the review.

With only fourteen studies identified with the above search strategy, the search was broadened to include studies of abdominal surgery in adult populations. An
additional 13 studies were identified, thus, a total of 27 studies included in this review (Table 2.1).

Of those 27 studies, only two studies were found that addressed the impact of CPOP on healthcare use and health-related quality of life (HRQOL).

The websites for Statistics Canada, the World Health Organization, and the International Association for the Study of Pain were also searched for definitions and relevant statistics to better understand the number of women potentially at risk for CPOP.

Almost all studies identified by the review were limited to the immediate postoperative period, with final follow-up limited to the first two days after surgery. Thus, these studies addressed acute postoperative pain rather than CPOP. The initial search specific to pain after c-section yielded five studies, not including literature reviews and studies of pain expectancy. Only two of these studies addressed pain extending into the weeks after surgery. When abdominal surgery was searched an additional 13 studies were identified, four of which measured and/or described pain experienced in the weeks following surgery. Furthermore, the few studies addressing chronic pain were often limited by small sample sizes.

Literature Review

Cesarean Sections in Canada

C-section is a potentially life-saving operation that may be deemed necessary to prevent morbidity and mortality in both mother and baby. In 1993, 34.3% of c-sections performed in Canada were deemed necessary due to prior c-section, 17.5% were indicated for dystocia, 11.0% for breech presentation, and 10.0% for fetal distress (Millar, Nair, & Wadhera, 1996). A study in the Netherlands between 1983 and 1992
reported discrepancy between fetal and maternal pelvis size (21.6%) as the most commonly cited reason along with obstructed labour (17.1%), and fetal distress (16.5%) (Mulder, van Dongen, & van Ham, 1997).

Both the number of births and the c-section rate have increased in Canada. At present, the annual number of births has increased, climbing from 328,155 in 2001 to 343,517 in 2006 (Statistics Canada, 2007). C-sections have historically been viewed as a last resort, but the c-section rate started to rise in 1979 until it reached 20% in 1989 (Werschler, 1998). The 1986 National Consensus Conference on Aspects of Cesarean Birth’s re-examination of the risks and benefits sparked a decline in the surgery’s popularity in the early 1990s (Millar, et al, 1996). Since then, the cesarean rate has steadily increased and reached 23.7% for the year 2002 (Canadian Institute for Health Information, 2005), despite the WHO’s recommended c-section rate of 15% (Pan American Health Organization, 2002).

**Pain Management after C-Section**

Two reviews of pain management after c-section were identified in the literature search (Lavand’homme, 2006; Pan, 2006). The first review highlighted the potential pain issues of this population and the scarcity of research with follow-up extending past the first postoperative days (Lavand’homme, 2006). The reviewer concluded that, despite the ability to control acute pain at rest with opioid analgesics, pain with movement was unrelieved thereby presenting clear challenges to newborn care. According to Lavand’homme (2006), only one study was cited that followed women past the acute period to examine long-term pain outcomes. Three months after c-section, 19% of women reported pain. The reviewer concluded that research needs to extend beyond the
first two days to examine long-term analgesic consequence and efficacy in pain management.

The second review also examined the management of acute pain after c-section and highlighted the unique needs and considerations of this population (Pan, 2006). Analgesic selection is limited by the fact that some medications may put the newborn at risk for exposure through breast milk. Analgesics with the adverse affect of sedation may also limit the mother’s ability to provide safe newborn care. With a paucity of research on chronic pain issues, the reviewer concluded that research is necessary to identify predictors of severe acute postoperative pain and chronic postoperative pain for better treatment and evaluation of pain management.

*Chronic Post-Operative Pain After C-Section*

Only one descriptive study was found that examined chronic incisional pain following c-section. Out of 244 consecutive cases contacted, 220 women returned the survey questionnaires on pain and its impact on quality of life six to 18 months following their surgery. Prior history of pain, surgical history, height and weight, and surgical procedure data from patient charts were also collected. The results suggested that most women’s pain resolved within three months. In 18.6% of the sample, however, pain was persistent beyond three months and pain was present at the six to 18 month follow-up in 12.3% of women. Pain of at least moderate intensity was present during both rest and activity and experienced at least every few days in 5.9% of participants. Carrying a baby or other heavy object was a commonly reported cause of pain. Women denying pain often cited discomfort and abnormal sensations around the scar. Prior abdominal surgery, type of incision, infection, and BMI > 25 were not associated with pain outcomes,
however, use of general anesthesia, presence of pain at other body sites, and higher recall of acute postoperative pain were associated with pain outcomes (Jensen, Kehlet, Nikolajsen, & Sørensen, 2004).

**Chronic Post-Operative Pain after Abdominal Surgery**

Four studies were identified that addressed long-term post-surgical pain after abdominal surgery, but one was excluded due to its strictly geriatric sample. A prospective study of 150 consecutive patients undergoing laparoscopic cholecystectomy investigated CPOP (Bisgaard, Kehlet, & Rosenberg, 2005). Preoperatively, participants underwent a cold pressor test and were screened for neuroticism. One year postoperatively, follow-up pain questionnaires were mailed. Moderate to severe chronic pain in the absence of an identifiable pathological cause was reported by 5.3% of participants.

In a retrospective study of CPOP after hysterectomy, pain questionnaires were mailed to 1,299 women one year after surgery (Brandsborg, Nikolaksen, Hansen, Kehlet, & Jensen, 2007). Pain was reported by 32% of women, with 13.7% reporting this pain at least two days per week. Using a hysterectomy database constructed for the purpose of improving pain outcomes, the preoperative and surgical data of the women in the study sample was used for comparison with pain outcomes. From the sample, approximately 15% of women reporting pain at one year had not reported pain prior to surgery. Preoperative variables that were correlated with poor pain outcomes included chronic pelvic pain, prior c-section, and pain either as an indication for surgery or from a different cause. Pain outcomes were not different for women who underwent vaginal versus abdominal hysterectomy.
In a study by Heintz (2005), 82 women were randomized to receive corrective surgery for uterovaginal prolapse by either abdominal or vaginal surgery. Postoperative pain was the primary outcome with higher rates of pain, both acutely in hospital and six weeks later, reported after abdominal surgery. The study concluded that abdominal surgery should be avoided when possible due to negative pain and pain-related mobilization issues.

**Chronic Post-Operative Pain with Other Surgical Procedures**

CPOP was addressed in one literature review, which commented on its presence after various types of surgical procedures (Iohom & Shorten, 2003). The review included literature on CPOP after limb amputation, thoracotomy, breast surgery, cholecystectomy, inguinal hernia repair, and a final category of miscellaneous surgeries. A few studies addressing orthopaedic and dental populations were cited however a lack of available research identifying CPOP in these surgical populations was identified. The highest prevalence estimates were reported after limb amputation (30% - 81%), thoracotomy (62%), and breast surgery (50%). Conclusions about prevalence, however, are limited due to follow-up parameters not being reported in the research papers reviewed.

**Pharmacological Treatment of Long-Term Pain after C-Section**

Only one study addressing potential treatment to improve pain outcomes after c-section was found (Doherty, Magann, Newnham, Paech, & Verity, 2006). This controlled trial randomized 120 women to receive one of three interventions in addition to the hospital’s usual protocol for pain management: magnesium sulphate 50 mg/kg loading dose followed by 2g/h, magnesium sulphate 25 mg/kg loading dose followed by 1g/h, or a placebo of normal saline. The magnesium or placebo solution was initiated
one hour prior to surgery and continued for 24 hours after the loading dose. During postoperative days one and two, a visual analogue scale (VAS) was used to measure pain with rest and with movement and analgesic use was recorded in patient charts. Six weeks after surgery, participant pain was measured and mapped using a vonFrey filament, and analgesic use was measured by patient report and a pill count. No difference between each of the three groups with regards to either acute or chronic pain was identified.

Pain and Recovery

A prospective observational study of 175 surgical patients examined the impact of acute postoperative pain and other variables on recovery (Buckley, Pavlin, Penaloza, & Pharm, 2004). Six possible surgical procedures were included in the study, two of which occurred in the lower abdominal or groin area: pelvic laparoscopy and hernia repair. Pain scores, medication use, sleep, and activity level were measured 24 and 48 hours following surgery. Twenty-four hours after surgery, 60% of the sample rated their pain as greater than 3/10 and 20% rated pain as greater than 7/10 despite 89% using analgesics. Pain increased after discharge, with higher pain scores prior to discharge correlated with higher pain scores at home. Inability to fall asleep due to pain was reported by 18% and an additional 43% were wakened by pain in the first 24 hours. Activity level was reported at 33% and 47% of normal at 24 and 48 hours, respectively. Correlation analysis revealed that 31% of the variability in activity level at 48 hours was explained by pain scores over the past day. Participants validated this association with over half citing pain as the primary or secondary reason for activity limitation.
Pain and Health-Related Quality of Life

In a qualitative study, 21 individuals were interviewed two weeks postoperatively (Harnish, Long, & Urbach, 2005). The study goal was to develop a conceptual framework for HRQOL and long-term recovery after abdominal surgery. Six domains of HRQOL were identified in the study: physical limitations, functional impairment, pain, visceral impairment, sleep, and mood. Physical limitations of entering/exiting bed and walking were reported by approximately half of the participants, with six participants reporting difficulty with reaching. Limited activities were reported by all participants, bathing by 19, and self-care by seven. Pain was a common finding; 16 participants reported abdominal pain, 11 reported other pain, and 10 reported incisional pain. Five participants reported anxiety and depression, with six feeling helpless and/or dependent, and frustrated.

Impact of Chronic Pain on Healthcare Use

Two studies describing healthcare use after surgery were identified (Dukes, McDermott, Rowbotham, Schaefer, & Toelle, 2006; Van Den Kerkhof, et al, 2006). One study measured healthcare visits, but did not differentiate between visits for pain and visits for other reasons, and was thus not included in this review (Van Den Kerkhof, et al, 2006). A cross-sectional survey of 602 individuals examined healthcare use with chronic pain (Dukes, McDermott, Rowbotham, Schaefer, & Toelle, 2006). Participants, at time of recruitment, had been diagnosed with chronic pain for a minimum of three months and were recruited across six European countries. To estimate total resources utilized by this population, data on pain intensity and interference, medication use, therapy, and physician visits was collected. Fifty-four percent of the sample reported moderate to
severe pain. Prescription medications were used by 93%, non-prescription by 33%, physical treatments by 42%, and topical lotions by 35% of the sample. An additional 43% of participants were also receiving medication for concurrent anxiety, depression, and/or sleep disturbance. Seventy-six percent reported at least one physician visit in the past four weeks, with 33% visiting once, 25% visiting twice, and 29% visiting their doctors thrice or more in the same four-week time period. Thus, the possible impact of chronic pain after c-section poses a potential challenge with the limited resources of the healthcare system.

Potential Cause of Chronic Postoperative Pain

With the negative potential implications of CPOP, researches have attempted to discover its origin. While the cause remains unknown, research has highlighted neuroma formation from severed or scared nerves as a possible mechanism (Al-attar, Ducic, & Moxely, 2006; Almeida, Candido dos Reis, & Rosa e Silva, 2002). Seven consecutive women with chronic pain following hysterectomy, c-section, or oophorectomy were treated for neuroma formation with resultant reports of complete pain relief. Where opioids had failed to manage pain, complete absence of pain was attained by surgerical neuroma treatment within two weeks of the procedure. Freedom from pain was still reported at six months follow-up (Al-attar, Ducic, & Moxely, 2006), however conclusions about the cause of CPOP remain limited by the small sample size.

Predictors of Acute Post-Operative Pain

Anxiety and Depression

With the cause of CPOP unclear, research has searched for association between preoperative and acute variables and pain outcomes. Most studies concurrently addressed
the roles of both anxiety and depression, thus associations between postoperative pain, and anxiety and depression will be presented here under the same subheading. One literature review and eight studies were found that addressed a potential association between pain and anxiety, with three of these studies including depression and one including catastrophization in their analyses.

A review of these studies indicated that an association between anxiety and postoperative pain was a fairly consistent finding (Vaughn, Wichowski, & Bosworth, 2007). Caution was given in interpreting these results, however, as methodology and sample sizes were varied with some papers’ findings not supporting this correlation. In a study using the State Trait Anxiety Inventory (STAI) state anxiety as compared with trait anxiety was more often cited as a possible correlate with postoperative pain.

Three studies were found specific to anxiety and pain after c-section (Hobson, Slade, Wrench, & Power, 2006; Pan, et al., 2006; Keogh, Hughes, Ellery, Daniel, Psy, & Holdcroft, 2006). A study of 85 women assessed preoperative anxiety and postoperative recovery three days after surgery using the STAI and a 7 item Likert scale questionnaire, respectively (Hobson, Slade, Wrench, & Power, 2006). State anxiety was significantly correlated with reports of quick recovery, pain and activity, tiredness, and the total recovery score. Trait anxiety, on the other hand, was associated with only quick recovery and tiredness. Thus, state anxiety is again identified as a potential predictor of pain-related outcomes after c-section, affecting the broader experience of recovery.

Aiming to further define the relationship between anxiety and acute pain, a study of 34 women scheduled for a planned c-section measured the association between anxiety and pain (Pan, et al. 2006). Pain was measured both at rest and with activity.
use was also captured. No association was identified between anxiety and either pain at rest or pain with movement during the first 24 hours following surgery. Anxiety, however, was the sole predictive variable of total analgesic requirement. In this study, the relationship between state and trait anxiety, and postoperative pain remains unclear.

A study of 65 women examined fear of pain and how this, along with anxiety and preoperative pain, influenced the planned c-section experience for both mother and birth partner (Keogh, Hughes, Ellery, Daniel, Psy, & Holdcroft, 2006). Data collection occurred 36 weeks prior to c-section, just prior to transfer to the operating theatre, after initiation of neuraxial analgesia, at time of surgical incision, and postoperatively on the ward. Maternal fear increased until insertion of neuraxial analgesia then dropped by time of incision. The drop in fear persisted for the postoperative period. Reports of fear were associated with mean anxiety scores, negative expectations of the birth experience, and postoperative pain outcomes. Further investigation indicated that birth partner’s fear may be related to maternal fear, thus being an indirect correlate of maternal postoperative pain. Perceived control over pain medication was also associated with postoperative pain.

When broadened to include all abdominal surgeries, an additional five studies were identified (Adamatti, et al., 2002; Carr, Thomas, & Wilson-Barnet, 2005; Lin & Wang, 2005; Allen, Brockbank, Carr, & Strike, 2006; Kain, Sevarino, Alexander, Pincus, Mayes, 2000). A large prospective cohort study (n = 346) of inpatients undergoing elective abdominal surgery explored the role of various preoperative variables in moderate to intense acute postoperative pain at 12 and 24 hours (Adamatti, et al., 2002). Poorer pain outcomes were reported with ASA status III (odds ratio[OR] = 1.99), acute
(OR = 2.96) and chronic preoperative pain (OR = 1.75), trait anxiety (OR = 1.74), and depressive mood (OR = 2.00). These findings are similar to those of a smaller, randomized controlled trial (n = 62) of abdominal surgery that evaluated an education intervention to reduce pain (Lin & Wang, 2005). Preoperative pain, pain attitude, and anxiety were measured. Follow-up occurred at four and 24 hours after surgery. The intervention was successful in lowering preoperative anxiety scores, with the intervention group reporting less postoperative pain during activities such as repositioning and deep breathing/coughing at both points of follow-up.

A study of 85 women addressed the influence of anxiety and depression on postoperative pain after major abdominal gynecologic surgery (Carr, Thomas, & Wilson-Barnet, 2005). Pain was measured by the Brief Pain Inventory, with scores of anxiety, depression, and pain collected on postoperative day (POD) two, four, and ten. Anxiety scores were significantly correlated with worst postoperative pain at all points of follow-up. Depression was significant only on POD four. This variation may be linked to anxiety rates remaining high throughout the postoperative period, while depression was found to peak on POD four and then decline.

Similarly, a sample of 80 women was recruited to examine preoperative anxiety and pain outcomes after gynecologic surgery (Allen, Brockbank, Carr, & Strike, 2006). Demographic information and baseline anxiety were recorded ten days prior to surgery and compared with anxiety scores the day before, day of, and two days following surgery. Anxiety was measured with the STAI and a score greater than 45 was considered indicative of significant anxiety. Pain was also measured on the first and second POD using a VAS. At the preadmission clinic, significant anxiety scores were
detected in 41.3% of the sample and rose to 67% when anxiety peaked in the preanesthetic period. Postoperatively, anxiety was present in 20% and 19% on POD one and two, respectively. Both pre- and post-operative state anxiety were weakly correlated with postoperative pain. When examining predictors of high state anxiety, high trait anxiety scores, major versus minor surgery, and previous pain experiences were identified.

The results of a small repeated-measures study of 35 women undergoing abdominal hysterectomy supported the role of state anxiety in reports of postoperative pain (Kain, Sevarino, Alexander, Pincus, Mayes, 2000). Data collection occurred preoperatively and postoperatively within the first hours after surgery, on the ward, and during the first week after discharge. State anxiety was significantly correlated with pain immediately after surgery and on the ward. Acute postoperative pain in hospital was predictive of pain reports during the first week at home.

A small study (n = 38) examined the influence of anxiety, pain and catastrophizing in men and women as predictors of acute postoperative pain following elective abdominal surgery (Ferber & Granot, 2005). The results suggested that postoperative pain was significantly predicted by both state anxiety and catastrophizing.

**Pain Expectancy**

Although the review identified no studies of pain expectancy and outcome after c-section or abdominal surgery, an association been the expectation and the experience of pain has been identified. The expected ability to cope with pain has been identified as a predictor of pain tolerance in experimental cold pressor pain tests (Cipher & Fernandex,
Similarly, this association has been identified with treatment pain as experienced by 381 participants receiving emergency dental treatment (Gedney & Logan, 2007).

A prospective study examined pain expectancy, fear, and function in 141 people reporting general neck and/or back pain. Participants were sent questionnaires via postal mail to capture information on pain and functional disability one year after initial assessment. Pain expectancy, after controlling for initial pain scores, was predictive of both pain and disability at 12 months. Affective response to chronic pain, as measured by the Pain Discomfort Scale, was also associated with pain and disability at 12 months (Boersma & Linton, 2006). Thus participants expecting more pain and reporting more pain-related distress at time of initial data collection were more likely to report pain and resulting functional limitations one year later.

Other research suggests a less prominent role of pain expectancy (Crombez, Vervaet, Baeyens, Lysens, & Eelen, 1996). In a prospective study of 29 individuals with chronic low-back pain, participants were asked to perform a series of exercises, and to report on expectations of pain and injury prior to executing each activity. Participants expectations of pain varied over the course of the activities, as pain expectancy was modified based on the previous activity’s outcome. Thus, pain expectancy was predictive of pain, but influenced by prior experience.

Acute Pain as a Predictor of Chronic Pain

A prospective study of 220 women undergoing c-section assessed pain related to surgery at a mean of 10.2 months (Jensen, et al. 2004). Approximately 6% reported chronic pain with the results indicating that chronic pain was predicted by recall of
severe, acute, post-cesarean pain. With only 6% of the sample reporting chronic pain, however, correlational calculations were based on a small number of participants.

This finding is supported by other studies. Bisgaard, et al (2005) conducted a prospective study of 150 inpatients undergoing elective abdominal surgery. Initial data included preoperative cold pressor and neuroticism tests and pain scores in the acute postoperative period. One year later, participants were mailed follow-up questionnaires capturing current pain information. Intense acute pain was the only variable associated with reports of chronic pain at follow-up. Only 5% of respondents reported continual pain in the absence of a clear cause, providing a small sample to measure correlation with preoperative and acute postoperative variables.

Conclusion and Implications for Practice

CPOP has been identified in the abdominal surgery population, indicating that this group is at risk of poor pain outcomes and decreased HRQOL. The cause of CPOP is unclear, however research suggests the acute pain experience and psychological factors may influence postoperative pain outcomes. The individual burden of chronic pain translates into both economic and healthcare challenges as suffering individuals may not be able to work and may need medical attention that extends into the months after surgery. Despite this information and the Canadian statistics on number of c-section births, CPOP after c-section has been addressed by only one study identified by this review. The c-section population is unique as new mothers cope with their own recovery needs and those of newborn care. Thus, the prevalence of CPOP, risk factors for poor pain outcomes and quality of life issues experienced after c-section remain unknown.
Table 2.1.

Summary of Literature Review Methods and Findings

<table>
<thead>
<tr>
<th>Databases Searched</th>
<th>MEDLINE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CINAHL</td>
</tr>
<tr>
<td></td>
<td>EMBASE</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Key Words</th>
<th>“Cesarean section,” “Pain, postoperative,”</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>“Long-term pain,” “Chronic pain,”</td>
</tr>
<tr>
<td></td>
<td>“Abdominal surgery,” “Chronic post-</td>
</tr>
<tr>
<td></td>
<td>operative pain,” “Anxiety,” “Depression,”</td>
</tr>
<tr>
<td></td>
<td>“Somatization,” and “Pain expectancy”</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total Number of Studies Identified</th>
<th>1,363 studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>(some studies repeated in several</td>
<td></td>
</tr>
<tr>
<td>search strategies)</td>
<td></td>
</tr>
</tbody>
</table>

| Total Number of Studies Meeting Inclusion Criteria | 27 |
CHAPTER THREE

Design

This thesis follows a prospective descriptive design. As a pilot study, this thesis provides data on accessibility of the c-section population, use of online data collection, and highlights areas for future research in this population. Being prospective and descriptive in nature, participants were screened for possible predictors of the main outcome variables and then followed over time to examine associations with the independent variables. As a pilot study, the purpose of investigating these relationships is to develop hypotheses for future study.

Research Questions

The intentions of this thesis are twofold, with pilot study research questions addressing feasibility issues organized under the first three headings, and a final, general research question for the purpose of hypothesis development under the fourth heading.

Population Access

1. What is the average number of women recruited per week?
2. What proportion of women scheduled for an elective c-section will consent to participate in a research study?
3. What proportion of women is lost to follow-up?

Completeness of Patient Charts

4. What proportion of hospital charts is complete for extraction of the necessary procedural and health information?
Online Data Collection

5. What proportion of women report access to a computer to complete online questionnaires from home?

6. What proportion of women preferred online, paper and pen, or telephone formats of the follow-up questionnaires?

Pain and Healthcare Use in this Population

7. What proportion of women report pain prior to c-section?

8. What percentage of women report pain at six weeks after c-section surgery?

9. What healthcare services do women access for pain before and after c-section?

Hypothesis-Developing Research Question

10. What is the prevalence of chronic pain at six-weeks following c-section and is it associated with preoperative pain, HRQOL, depression, anxiety, somatization, healthcare use, or demographic and/or procedural details?

Conceptual Framework

To meet these objectives, the study was guided by the Theory of Unpleasant Symptoms (Appendix A). This theory illustrates the potential for multiple physical psychological, and situational factors to influence the experience of symptoms and performance. This relationship is paralleled in the thesis with the implicit hypothesis suggested in the larger study research question. It is hypothesized that the preoperative variables of pain, anxiety, depression, somatization, and pain expectancy will interact to influence pain and HRQOL six weeks postoperative. According to the framework, the experience of both pain and HRQOL will then affect performance as defined as healthcare use in this study (Gift, Lenz, Milligan, Pugh, & Suppe, 1997). For the purpose
of this thesis, the effect of performance on symptoms and physical, psychological, and situation factors will not be explore (Appendix B).

The literature review highlighted the spectrum of psychological, physical, and situational variables associated with poor postoperative pain outcomes. This framework allows for multiple and interacting variables to influence the experience of both postoperative pain and HRQOL. Through this effect on the experience of symptoms, these interacting variables may play an indirect role in healthcare use. With little research available on pain-related healthcare use, it remains to be explored what specific elements of the pain experience and other variables affect use. This possible association depicted in the conceptual framework is implied in the hypothesis-developing research question.

To address the hypothesis-developing research question the influence of physiological factors such as preoperative pain, situational factors such as state anxiety and demographic data, and psychological factors such as trait anxiety, depression, and somatization will be explored. The symptoms of interest in this thesis are postoperative pain and HRQOL at six weeks. Following the theory diagram, the effect of these symptoms on healthcare use (i.e. the performance that results from the experience of pain and HRQOL) will be investigated. The feedback of performance on pain and HRQOL and the situation, physical, and psychological factors will not be explored in this thesis.

The Theory of Unpleasant Symptoms has previously been used in the postpartum population to study fatigue. The fit of this conceptual framework with a non-specific symptom such as pain, has been highlighted as one of this framework’s strengths (Rychnovsky, 2007; Pugh, Milligan, Parks, Lenz, & Kitzman, 1999).
Sample

This thesis will focus on women having a cesarean delivery, fitting within the larger group of studies addressing postoperative pain and HRQOL in women. As the decision to have an emergency c-section is generally made after birthing complications and is quickly followed by surgery (Childbirth.org, 1999), this study was limited to women undergoing a planned c-section. The sample was formed by 41 women who gave informed consent. One participant withdrew from the study after completing the initial questionnaires, and a second participant underwent a hysterectomy in addition to c-section for fetal demise, so preoperative data on 41 participants was collected, however only 39 participants had their charts reviewed and were followed-up. Forty participants were considered to be an adequate sample for the purpose of describing issues in this population and could be recruited in a reasonable time frame for the purpose of this thesis research.

Potential participants were identified from the operating room schedule of an Eastern Ontario Hospital. Women were considered eligible if they were:

1. Age 18 or older
2. Able to speak, read, and write in English.
3. Arriving at least two hours prior to scheduled c-section

Eligible women were approached after arrival on Connell 5, the labour and delivery wing of the hospital. As per this hospital’s protocol, women were advised to arrive two hours prior to their scheduled c-section. Data collection occurred between two time periods: July to October 2006 and February to March 2007. Recruitment was initially started in collaboration with a pilot study examining CPOP in women
undergoing abdominal surgery for gynecological procedures, but was interrupted when CIHR funding was acquired to conduct a larger study of CPOP and abdominal surgery. This pilot study was resumed by the student researcher who began collecting data in February.

Approaching these women depended on their arriving at the labour and delivery ward punctually. In the two hour window between arrival and surgery, there is necessary bloodwork, initiation of intravenous (IV) access, introductions of surgical staff, and review of surgical risks. Women were approached for participation after placement in a temporary bed, initiation of IV access and bloodwork if sufficient time remained to complete study questionnaires. Due to the small window of time to approach potential participants and overall study time limitations, a consecutive, convenience sample was formed.

Procedure

A computerized data collection system and database were constructed to allow for online data collection. The database was password protected and kept behind the hospital firewall. After logging-in, the researcher was able to add potential participants to the database from the operating room list. The number of women who arrived too late to complete preoperative questionnaires was recorded for the purpose of tracking the feasibility of recruitment timing. Within the database, a woman arriving with too little time to participate in the study was labeled as not approached due to a scheduling conflict. If a woman was approached but did not wish to participate, her reason for decline was added to the database. Consenting women were offered the choice of preoperative questionnaires via tablet computer or paper. The questionnaires were
accessed by first selecting a participant’s name to allow for identification of their data. The resulting screen with the list of questionnaires was then offered to the consenting participant, along with verbal instructions for tablet use. To keep other participants’ information confidential, a password was required to re-enter the database and access other participant names and data. The researcher remained available to answer questions during questionnaire completion regardless of selected questionnaire style.

Preoperatively, data on pain, HRQOL, healthcare use, depression, anxiety, somatization, and demographics were collected. If the participant selected paper copies, their information was manually added to the database by the student researcher. After providing informed consent and completing the preoperative questionnaires, each participant was given a package containing a copy of their consent form, an outline of the study with the researcher’s contact information and guidelines for online follow-up. A medication and healthcare use journal as a tool to record use was also included in this package.

Postoperatively, a chart review was conducted for the purpose of gathering health and obstetrical history, surgical procedure, and acute pain scores in the Post-Anesthesia Care Unit (PACU) and on the ward (Appendix C). The number of charts with incomplete data was tracked to provide organizational data useful for a future study. The student also kept a field journal to record important observations and comments made by participants.

Follow-up occurred six weeks postoperatively. An item on the preoperative demographics questionnaire (Appendix D) asked for an email address for the purpose of tracking the proportion of women with email access. This address was used to send out
follow-up automated emails containing a website address and the participant’s unique login information. The website looked similar to what was offered on the tablet preoperatively but only listed the postoperative questionnaires on pain, HRQOL, and healthcare use. If a participant did not provide an email address or if there was no response to the automated email, the participant was contacted by telephone to confirm the email address and willingness to continue in the study. Women willing to continue participation were offered the questionnaires via website, mail or telephone and contacted up to three times before considered lost to follow-up. A contact log was available within the database to track follow-up communication. In the case that an email was returned as undeliverable, a package with both paper copies and website and login information was mailed.

Instruments and Definitions

Chronic pain is defined by the International Association for the Study of Pain (IASP) as pain that has extended beyond the expected healing trajectory with no biologic function (IASP, 2003). Since this pilot study was time-limited, chronic pain was operationalized as pain which remained six weeks after surgery in the absence of reported painful post-surgical complications. Preoperatively, pain was measured by the Brief Pain Inventory – Long Form (BPI-LF) (Appendix E). Unlike the short form, this version of the Brief Pain Inventory begins with demographic questions and captures pain experience over the past week. The Brief Pain Inventory – Short Form (BPI-SF) was used postoperatively to capture pain over the past 24 hours (Appendix F). The BPI-SF was used postoperatively because it is shorter, thereby decreasing questionnaire burden. Both versions of the BPI generate two scores: pain intensity and pain interference. The pain
intensity score is an average of four responses to questions of pain at its worst, least,
average, and present intensity. The pain interference score is an average of seven items
that asks the respondent to report on interference with general activity, mood, walking
ability, normal work, relations with other people, sleep, and enjoyment of life. Both
scores have a possible range of answers from 0-10, with a higher score indicating higher
pain intensity or interference. According to the literature, a score of 0-3/10 is considered
“mild”, 4-6/10 “moderate” and 7+/10 “severe” pain (Dukes, McDermott, Rowbotham,
Schaefer, Toelle, 2006). Although originally intended to measure malignant pain, the
BPI has been validated in chronic non-malignant pain and its interference over time

HRQOL has been defined as involving the whole person, including both
psychological and physical well-being. Shannon & Walter (1990) wrote that there are
three possible definitions for quality of life, including subjective contentment with one’s
life. For this study, HRQOL was operationalized as a subjective rating of one’s total
health and the resulting freedom or limitation imposed on activities of daily living.
HRQOL was captured by the Health Survey Short Form 36 (SF-36) (Appendix G). Eight
dimensions are scored by this instrument: physical functioning, role limitations, bodily
pain, social functioning, mental health, emotion-imposed limitations, vitality, and general
health perceptions. Two composite scores are also calculated: the physical and mental
component scale scores. This tool’s validity has been tested in the general population of
the United States with excellent results. Its validity and reliability has also been tested in
chronic back pain (Abdalla, Buckingham, Garratt, Russell, & Ruta, 1993), and female
surgical populations (Edwards, 2007; Ayers, S. et al., 2004).
Pre- and post-operative healthcare use specifically for pain was defined by visits to a healthcare professional and analgesic use. From the healthcare use questionnaires, medical professionals included visits to a doctor, specialist, other healthcare professional, walk-in clinic, or emergency department. Medications included opioids, non-opioids, and combinations of opioid and non-opioid analgesics. All visits and medications currently in use were added to form total visits and total medications scores, respectively. The Pre-Surgical Health Care Utilization Form (Appendix H) and Six-Week Post-Surgical Health Care Utilization Form (Appendix I) were used to capture this data. These questionnaires were compiled by Dr. Van Den Kerkhof, using questions adapted from the Canadian Community Health Survey and the Canadian Multicentre Osteoporosis Study, to measure healthcare use related to surgical pain including healthcare visits and medication use (Van Den Kerkhof, et al, 2006). These questionnaires have not been validated in the surgical population, thus their comparability to other instruments used in the literature is limited and they have not undergone rigorous testing to ensure that the collected data accurately reflects healthcare use.

Depression is defined by the World Health Organization (WHO) as a “common mental disorder that presents with depressed mood, loss of interest or pleasure, feelings of guilt or low self-worth, disturbed sleep or appetite, low energy and poor concentration” and highlights that this may lead to impaired self-care and role performance (WHO, 2007). As the diagnosis of depression is more complex than scoring an instrument, this study measured depressive mood rather than a diagnosis of depression. Thus, the operational definition of depression for this study was self-reported low mood that affects enjoyment and functional ability. The Center for Epidemiological
The Center for Depression Research and Clinics Depression Scale (CES-D) was used to measure depressive mood (Appendix J). It has been deemed reliable and valid in many populations, and has been used in obstetric (Diego, Field, Hernandez-Reif, Kuhn, & Schanberg, 2006; Blow, Flynn, & Marcus, 2006) and chronic pain populations (Klinger, Klinke, Kohlmann, Kothe, & Ruther, 2007). Possible scores range from zero to 60, with a score of 16 or greater indicating significantly depressed mood (Beekman, et al, 1997). Reliability and validity have been tested in the general populations with an alpha of 0.85.

Anxiety is defined by the IASP as “a disproportionate response to vague, distant, or even unrecognized danger” (IASP, 2004). The operational definition, for the purpose of this study, was built on Kapnaoullas’ (1998) work in which anxiety is considered a subjective reaction to stress. Anxiety, similar to depression, was measured, not diagnosed, using the State Trait Anxiety Inventory (STAI). Two scores are generated from this tool: situation-specific (i.e. state) and general (i.e. trait) anxiety (Appendix K). This instrument has been used previously to assess anxiety in obstetric (Diego, et al, 2006) and female, pre-surgical populations. A score of 45 or greater is considered indicative of “high” anxiety as seen in the literature (Allen, Brockbank, Carr, & Strike, 2006).

Somatization disorder has been defined as a condition where the individual experiences multiple physical symptoms as a result of psychological problems. Physical causes of the generalized symptoms must be ruled out for diagnosis. Commonly reported symptoms include pain, gastrointestinal complaints, and pain/difficulty during intercourse (Medline Plus, 2006; NYU Medical Center, 2006). Seven physical symptoms have been determined as the cutoff for suspecting somatization (DeGruy, Kroenke, Spitzer, &
Pain After Cesarean. For the purpose of this study, somatization was defined as the tendency to report multiple vague symptoms and was measured by the Seven Symptom Screen Test (SSST) (Appendix L). A somatization score was calculated by adding the number of symptoms selected.

Pain expectancy has been hypothesized to influence the pain experience (Cipher & Fernandex, 1997; Gedney & Logan, 2007; Boersma & Linton, 2006), and was thus included as a possible predictor of pain outcomes. Pain expectancy for six weeks after cesarean was captured on an 11-point scale by the Pre-Surgical Health Care Utilization Form. The reported score was analyzed as a continuous variable, and was categorized as mild, moderate, or severe pain based on grouping used in the literature (Dukes, et al, 2006).

Analysis

The variables are organized within the study as main outcomes, secondary outcomes, and potential predictors of these outcomes. Their measurement and distribution are summarized in Table 3.1.

Main Outcome

The main outcome variable was postoperative pain. This was measured using four pain scores. Forming a dichotomous variable, pain was measured using the item from the BPI-SF that asks whether the respondent has experience pain within the past 24 hours (Appendix F). Both pain intensity and interference scores were analyzed as continuous variables, also providing insight into pain during the preceding 24 hours. Finally, the bodily pain score from the SF-36 was used as a continuous score to capture pain over the past four weeks.
Secondary Outcomes

Secondary outcomes were HRQOL as measured by the SF-36 physical and mental component scores and postoperative healthcare use as measured by healthcare visits and medication use from the Six-Week Post-Surgical Health Care Utilization form. Physical and mental component scores were compared to age- and sex-matched norms, and analyzed as continuous variables.

To analyze postoperative healthcare use, the total visit and total medication scores were used. These scores were treated as continuous variables during analysis.

Independent Variables

The independent variables in this study are demographic data, procedural data, acute pain, preoperative pain, preoperative HRQOL, depression, state and trait anxiety, somatization, pain expectancy, and preoperative healthcare use. The demographic data of interest included age, marital status, education level, and job status. All demographic data was collected from the demographic questionnaire with the exception of job status which was one of the demographic questions on the BPI-LF. Age was categorized into three groups: 20-29, 30-34, and 35-40 years. The aim of defining the groups by these ages was to create three equal size groups for comparison.

The chart review provided both procedural data and acute pain scores. Type of anesthetic, type of incision and closure, prior abdominal surgery, undergoing concurrent tubal ligation, and highest recorded pain scores on the ward and PACU were included in the analysis. The decision to include these variables was based on the findings of research in c-section or abdominal surgical populations (Lavand’homme, 2006; Brown &
All procedural data included in the analysis are categorical variables.

As an independent variable, acute pain was analyzed as both continuous scores, and categorized as mild, moderate or severe based on cut-offs used in the literature (Dukes, et al, 2006).

Preoperative pain, HRQOL, and healthcare use scores were calculated the same as their postoperative counterparts, except that the preoperative scores were treated as independent variables during analysis.

Depression and state and trait anxiety were analyzed as both categorized and continuous scores. The continuous scores were calculated based on questionnaire scoring instructions. Using the cut-off scores found in the literature, these scores were then categorized as being either within the normal range or indicative of significant depressive mood, or anxiety. The definition of somatization is based on an individual selecting seven general symptoms (DeGruy, Kroenke, Spitzer, & Swindle, 1998). No participant selected all seven symptoms therefore, for the purpose of this study, somatization was analyzed as a continuous score to assess for a possible relationship between number of items selected and CPOP.

Pain expectancy for six weeks after surgery was collected using an 11-point numeric rating scale provided on the Pre-Surgical Healthcare Utilization form. Using the same mild, moderate, or severe criteria as pain intensity and interference scores, this variable was analyzed as both a categorical and continuous score.
Descriptive Analysis

The pilot study research questions were addressed using descriptive analysis. Percentages were used to present accessibility to the study population through participation rate (question 1), recruitment rate (question 2), and proportion lost to follow-up (question 5). Percentages were also used to present online access (question 3) and preference of participants for online, paper, or telephone data collection format (question four). The proportion of incomplete charts was calculated and presented as a percentage to address research question six.

Prevalence of both pre- and post-operative pain was presented as a percentage (questions 7-8) using reports of pain from the BPI (Appendices E and F). Healthcare use was captured through reports of pain-related medication and medical visits. Percentages were used to present this data, with medication use categorized by analgesic type and total visits categorized to create three equal groups (question 9).

The sample was described in terms of independent variables potentially associated with pain outcomes prior to correlation analysis. Mean questionnaire scores and 95% confidence intervals were calculated for depression, anxiety, and somatization. Depression and state and trait anxiety scores were also categorized and presented as percent demonstrating significant depressive mood and state and/or trait anxiety. Acute pain and pain expectancy scores were each presented as both a mean with the CI and percentage of women in each previously outlined category of pain intensity.
Correlation Analysis

Before testing for associations between pre- and post-operative variables, the data was graphed to guide the decision of using non-parametric tests. All tests of correlation were two-tailed with significance set at an alpha of .05.

The hypothesis-developing research question (question 10) was addressed through tests of association and correlation. A chi square tested for associations of demographic and procedural data, and categorized depression, state and trait anxiety, pain expectancy, and acute pain scores with categorized pain score. To compare these same preoperative variables with mean postoperative pain intensity and interference, bodily pain, and physical and mental component HRQOL scores, a one-factor analysis of variance (ANOVA) or Kruskal-Wallis H test was used. Spearman’s Rank Order Correlation was used to test correlation between continuous postoperative pain and HRQOL scores, and depression, state and trait anxiety, somatization, pain expectancy, and acute pain.

Ethics

Ethics approval from the Queen’s Research Board of Ethics was received prior to study commencement. There were no known risks associated with participation in this study. For women declining to participate, care continued as normal. All participants provided informed consent, and were given contact information of research staff in case questions arose. All participant data was kept protected. Data within the database was protected by password and hospital firewall. All questionnaires completed via paper were stored in a locked cabinet. For data extraction and analysis, all participants were assigned a random identification number to maintain confidentiality.
Table 3.1

*Summary of Study Questionnaires, Scores, and Their Distributions*

<table>
<thead>
<tr>
<th>Questionnaire and Score(s)</th>
<th>Distribution</th>
<th>Possible Scores/Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brief Pain Inventory – Long/Short Form</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pain</td>
<td>Categorical</td>
<td>Yes or no</td>
</tr>
<tr>
<td>Pain Intensity</td>
<td>Continuous</td>
<td>0-10</td>
</tr>
<tr>
<td></td>
<td>Categorized</td>
<td>Mild, moderate, or severe (Dukes, et al, 2006)</td>
</tr>
<tr>
<td>Pain Interference</td>
<td>Continuous</td>
<td>0-10</td>
</tr>
<tr>
<td></td>
<td>Categorized</td>
<td>Mild, moderate, or severe (Dukes, et al, 2006)</td>
</tr>
<tr>
<td>Health Survey Short Form 36</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bodily Pain</td>
<td>Continuous</td>
<td>0-10</td>
</tr>
<tr>
<td>MCS *</td>
<td>Continuous</td>
<td>0-10</td>
</tr>
<tr>
<td>PCS **</td>
<td>Continuous</td>
<td>0-10</td>
</tr>
<tr>
<td>Center for Epidemiological Studies Depression Scale</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depressive Mood</td>
<td>Continuous</td>
<td>0-60</td>
</tr>
<tr>
<td></td>
<td>Categorized</td>
<td>Less or greater than 16 (Beekman, et al, 1997)</td>
</tr>
<tr>
<td>Questionnaire and Score(s)</td>
<td>Distribution</td>
<td>Possible Scores/Categories</td>
</tr>
<tr>
<td>---------------------------</td>
<td>--------------</td>
<td>---------------------------</td>
</tr>
<tr>
<td>State Trait Anxiety Inventory</td>
<td></td>
<td></td>
</tr>
<tr>
<td>State Anxiety</td>
<td>Categorized</td>
<td>Less or greater than 45 (Carr, et al, 2005)</td>
</tr>
<tr>
<td></td>
<td>Continuous</td>
<td>20-80</td>
</tr>
<tr>
<td>Trait Anxiety</td>
<td>Continuous</td>
<td>20-80</td>
</tr>
<tr>
<td></td>
<td>Categorized</td>
<td>Less or greater than 45 (Carr, et al, 2005)</td>
</tr>
<tr>
<td>Seven Symptom Screen Test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Somatization</td>
<td>Continuous</td>
<td>0-7</td>
</tr>
<tr>
<td>Pre-Surgical Health Care Utilization</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pain Expectancy</td>
<td>Continuous</td>
<td>0-10</td>
</tr>
<tr>
<td></td>
<td>Categorized</td>
<td>Mild, moderate or severe(Dukes, et al, 2006)</td>
</tr>
<tr>
<td>Total Healthcare Visits</td>
<td>Continuous</td>
<td>Fill in the blank</td>
</tr>
<tr>
<td></td>
<td>Categorized</td>
<td>0, 1-3, or 4+ visits</td>
</tr>
<tr>
<td>Six-Week Post-Surgical Health Care Utilization</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Healthcare Visits</td>
<td>Continuous</td>
<td>Fill in the blank</td>
</tr>
<tr>
<td></td>
<td>Categorized</td>
<td>0, 1-10, and &gt;11 visits</td>
</tr>
</tbody>
</table>

*MCS = Mental Component Scale Score

**PCS = Physical Component Scale Score
CHAPTER FOUR

Outline

Chapter four provides the results and discussion for the research questions related to feasibility: population accessibility, completeness of patient charts, and online data collection. Additional issues experienced in the implementation of this pilot study are also presented.

Accessibility

Results

Potential Participant Pool and Recruitment

Women were recruited at an average of two participants per week. The number of scheduled c-sections varied considerably, typically between one and eight surgeries per week with a total of 55 eligible women identified over the two courses of recruitment. Although women were instructed to arrive two hours prior to their surgery time, poor winter weather conditions and other extraneous variables caused some women to arrive late. This left little time to consent and participate in research in the preoperative period. Of the 55 eligible women, six of these women were not approached due to the above scheduling conflict preoperatively.

When a woman scheduled for an elective c-section presented to the labour and deliver floor, she was directed to a bed and instructed to put on a hospital gown. During the time between admission and surgery, intravenous (IV) access is initiated, blood samples are taken, introductions of surgical staff are made, the surgical consent form is reviewed, and hospital scrubs are given to the support person accompanying the woman into surgery. With this pain study, the researcher would also arrive two hours prior to an
eligible woman’s surgical time and wait until the floor staff had initiated IV access and taken blood samples. At this time, the researcher would approach the potential participant to introduce the study and review the consent form. After informed consent was given, the participant was offered the preoperative questionnaires. The completion of study questionnaires was occasionally interrupted by staff introducing themselves to the participant however participants were able to resume the filling-out of research questionnaires without a large loss of time.

Willingness to Participate

Forty-nine of the 55 eligible women were approached to participate in the study, with 41 (84%) women consenting to participate. Reasons for declining participation in the study included wanting to spend the time before surgery with family, and feeling too anxious about the pending surgery to focus on questionnaires. Retention and Loss to Follow-Up

Of the 41 participants enrolled in the study, one woman underwent additional hysterectomy for fetal demise. Her data was included when addressing the research questions, with the exception of hypothesis development as her surgical experience was considerably different from the rest of the sample. One woman (2%) alerted the researcher to her withdrawal from the study, reporting no extra time with the demands of newborn care. A second participant could not be reached for follow-up. Seven women did not respond to electronic and/or mailed copies of the questionnaires despite follow-up telephone calls. Thus, nine participants were lost to follow-up, representing 22% of the sample.
Burden of Administration

Despite the two-hour window between admission and surgery, many participants commented that the initial seven questionnaires were extensive, requiring an average of 30 minutes to complete. The Brief Pain Inventory Long Form (BPI-LF) and Health Survey Short Form 36 (SF-36) were the questionnaires most frequently reported as lengthy. The order of preoperative questionnaires in the package given to the participant was the same regardless of paper or online format. The BPI-LF was administered fifth out of seven questionnaires, followed by the SF-36; both instruments are six pages each in paper form compared to the other instruments which range from one to two pages in length. Regardless of length and order, all participants completed each of the preoperative questionnaires.

Discussion

These findings suggest that women undergoing elective c-section are willing to participate in a prospective, descriptive study examining pain and health-related quality of life (HRQOL). This study’s participation rate is slightly lower than the 90.2% participation rate in another recent study of CPOP in women undergoing c-section (Jensen, et al, 2004). This may be due to the difference in data collection methods and resulting time requirement of participants. With this thesis study, data was collected both pre- and post-operative from each participant, while data collection in the study by Jensen, et al, (2004) occurred only once by mailed survey six to 18 months after surgery.

Approaching potential participants upon admission for c-section depends on whether the hospital’s protocol allows a window of time for research purposes. In this study, weather conditions and the punctuality of eligible participants played a role in
access. Due to the time requirement for preoperative questionnaire completion, reducing the total number or length of preoperative questionnaires may also allow for the participation of eligible women presenting late to the hospital.

Postoperative data collection presented a problem with almost a quarter of the sample lost to follow-up. At six weeks, many of the women reported not having time to check their email and, thus, they missed the automated follow-up reminder. Many women promised to check for the study email but their questionnaires remained blank or unreturned, even after re-sending the email and several reminder telephone calls. From this study’s results, six weeks does not appear to be a good time for follow-up in this particular surgical population. A longer follow-up period may have allowed for the new family to form a routine with more time to participate in study follow-up while keeping within current definitions of CPOP used in the literature.

In the CPOP after c-section study by Jensen et al (2004), data collection occurred by postal mailed questionnaires at only 10.2 months after surgery. Thus, no data on the number of women lost to follow-up was available for comment on whether the proportion of women lost to follow-up in this sample is consistent with that reported in other literature.

Chart Review

Results

All charts were accessed and data was collected via a standard form (Appendix C). Only 38% of the patient charts were complete with commonly missing items including nausea, vomiting and pain in the post-anesthesia unit (PACU) (Table 4.1).
The patient chart in the PACU and on the ward has a place to document presence and intensity of pain on a 0-10 numeric rating scale. Pain data was not recorded in six charts in the PACU and two charts on the ward. From the complete charts, the majority of women reported no or mild pain in the PACU. In comparison, 86% of participants reported postoperative pain on the ward that reached moderate to severe intensity. Pain subsided or was reduced to a mild level in 80% (n = 30) with only 21% (n = 8) reporting moderate pain by time of discharge from the ward.

Discussion

In the chart review, ratings of acute pain were much more consistently documented on the ward than in the PACU. In the PACU, pain was frequently not recorded and when it was, it was rated as mild or absent. Although some charts had a pain score of zero to indicate no reported pain, those charts missing a pain score may also be a result of women reporting no pain. This being just a speculative explanation, only charts with documented pain scores of 0-10 were included in the analysis.

On the ward, pain ratings rose sharply. In addition to the wearing off of spinal anesthesia, this change could be explained, in part, by the increased movement required in newborn care (Lavand’homme, 2006).

These findings suggest that a chart review is not an effective method of consistently measuring pain during the immediate postoperative period in the PACU. Documentation of acute postoperative pain was more consistent on the ward with approximately 93% of charts complete with this data.
Online Data Collection

Results

Online access was measured by the number of women providing an email address on the preoperative demographics questionnaire. A total of 85% (n = 34) provided this contact information.

All email addresses that were verbally confirmed during a follow-up telephone call had been correctly entered into the database. One participant had given her husband’s email address, but this was easily fixed when the researcher called to verify the automated email was received. There were no issues resulting from inactive or faulty email addresses, aside from the one participant who could not be reached by any method at follow-up.

The majority of women preferred electronic questionnaires preoperatively. A very different preference was observed at time of follow-up with equal numbers requesting paper versus electronic copies (Table 4.2).

Discussion

Email access was reported by many women, with the online mode of data collection preferred by the majority of women preoperatively. Notes from the field journal indicated that several women consented based on the option to complete follow-up questionnaires online. The eagerness with which these participants selected electronic rather than paper questionnaires makes them candidates for web-based questionnaires to be completed at home before hospital admission for c-section. Collecting preoperative data prior to admission would allow a more flexible time frame for completion of questionnaires and increase the participant’s familiarity with the online database. This
revised time line of preoperative data collection would require the researcher to review the consent form and guidelines for database use prior to meeting the participant. Data collection on the night prior to c-section, for example, also may not provide as accurate a measure of women’s state anxiety as measurement two hours prior to surgery.

After delivery, however, almost equal numbers of women preferred online to paper copies. When contacted by telephone, the women requesting paper copies frequently followed this request by saying that they anticipated the mailed versions to be easier to complete amidst childcare. The mailed copies, unlike their online counterparts, may also have provided a visual reminder for completion. In light of this, the cost of constructing an online database must be weighed against the costs saved in materials and postage, given that nearly 50% of the sample preferred paper and pen to an electronic format.

Although studies of online data collection in the c-section population were not identified, this format of follow-up has been trialed in other populations. This study’s response rate is difficult to compare to other studies due to its unique methodology of offering online, in addition to telephone and paper, modes of questionnaire completion.

The online response rate in this study is higher than a survey study of chief officer nurses that reported an online response rate of 35% (Baernholdt & Clarke, 2006). This difference may be due to this thesis study’s participants entering their own email addresses compared to collecting addresses from employers as in Baernholdt and Clarke’s (2006) study. By having the participants enter their own addresses, errors may be avoided and, in the case of individuals with more than one email address, the email address most appropriate for research purposes may be used.
The participants entering their own addresses may only account for a part of the difference in response rate between the literature and this thesis study. A randomized controlled trial of email versus postal mail surveys to 1,333 Canadian Anesthesiologist Society members used email address that they had previously submitted for a prior study. The online response rate was 35% compared with a 69% response rate for postal surveys (VanDenKerkhof, Parlow, Goldstein, & Milne, 2004).

The higher response rate observed in this thesis study may be due to the participants being approached in person about their participation in the study. This allowed for the potential recruit to ask questions about the study and issues under investigation, which may have increased the likelihood that the woman would continue her participation at time of follow-up. Also, alerting participants to the fact that they would be receiving an email six weeks after their c-section may have prevented the research emails from being deleted under the assumption that it was junk mail.

This thesis study’s response rate is lower than a 1998 study of 100 participants cited in a review of online data collection (Brocato & Mavis, 1998). The response rate cited in that study was 56% for electronic mail. The lower response rate in this thesis study may be explained by each participant being given the option of follow-up format, while in the study cited by Brocato and Mavis (1998), the participants were randomly selected to receive the study questions by either electronic or postal mail. Thus, allowing participants to select the mode of follow-up may allow for a higher total response rate, although the number preferring to respond by electronic mail may be lower than the number of participants selecting postal mail follow-up.
Issues with Study Implementation

Results

The operating room schedule used to identify eligible women is posted on the hospital’s intranet one day in advance, which allowed the researcher to identify the following day’s surgeries. With no warning to the student researcher, rescheduling of a woman’s surgery was sometimes necessary due to poor weather conditions. Poor weather also prevented some women from arriving on the ward two hours prior to their scheduled surgery time. Late arrival to the floor ranged from five to seventy-five minutes later than expected. For effective use of time, the student researcher would wait on the floor for fifteen minutes past the expected time of arrival. If the potential participant had not arrived, contact information was given to the ward’s clerk, who would notify the student researcher if or when the woman arrived.

Due to pregnancy, the completion of preoperative questionnaires by either tablet or paper required a bedside table. After arrival on the ward, women were directed to a hospital bed. While sitting upright in the beds, women had difficulty balancing either the tablet or paper copies of the questionnaires without the use of a table. Often the bedside tables had to be cleared of personal and/or medical property prior to having enough space for questionnaire completion.

Discussion

Identification of eligible participants via the operative room list presented an issue when studying women undergoing elective c-section. In addition to weather, the risk of a woman scheduled for a c-section to deliver spontaneously via vaginal birth prior to the scheduled date may also compromise the accuracy of the operating room list. Depending
on the willingness of the ward’s staff, notification of these events prior to the researcher’s arrival on the ward may be possible.

In the case of this study, the labour and delivery staff were able to alert the student researcher to women arriving late on the ward. This allowed for recruitment of women arriving with enough time to complete preoperative questionnaires without the researcher having to wait on the ward.

Ergonomic positioning for questionnaire completion proved to be a problem resolved by the use of a table. Although clearing the hospital table assigned to the participant’s bed was accomplished, this time may be more effectively used. By having a table dedicated to research purposes available on the ward, a clean, useable surface could be made readily available to consenting women.

Recruitment of women in their homes prior to hospital admission may help resolve some of these issues. The completion of preoperative questionnaires in the participant’s home prior to hospital admission may reduce ergonomic concerns as participants would have access to their home furniture. Issues of weather and rescheduling of surgery for a later date may also be avoided, provided that the rescheduled date would not interfere with comparison of instrument scores. With such measures as state anxiety, however, the timing of administration may affect the instrument score, as state anxiety one week and one day prior to surgery may be different.
Table 4.1.

*Summary of Variables Most Often Missing in Reviewed Charts*

<table>
<thead>
<tr>
<th>Variable (n = 39)</th>
<th>Frequency (%) Complete in Chart</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vomiting Incidence at Discharge from PACU</td>
<td>28 (72)</td>
</tr>
<tr>
<td>Nausea Incidence in PACU</td>
<td>29 (74)</td>
</tr>
<tr>
<td>Nausea Incidence at Discharge from PACU</td>
<td>29 (74)</td>
</tr>
<tr>
<td>Vomiting Incidence in PACU</td>
<td>29 (74)</td>
</tr>
<tr>
<td>Highest Pain in PACU</td>
<td>33 (85)</td>
</tr>
<tr>
<td>Pain at Discharge from PACU</td>
<td>33 (85)</td>
</tr>
</tbody>
</table>
Table 4.2.

*Mode of Preferred Pre- and Post-Operative Follow-Up.*

<table>
<thead>
<tr>
<th>Time (n)</th>
<th>Mode of Data Collection</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preoperative (41)</td>
<td>Tablet</td>
<td>34</td>
<td>83%</td>
</tr>
<tr>
<td></td>
<td>Paper Copies (preference)</td>
<td>1</td>
<td>2%</td>
</tr>
<tr>
<td></td>
<td>Paper Copies (server unavailable)</td>
<td>6</td>
<td>15%</td>
</tr>
<tr>
<td>Postoperative (30)</td>
<td>Online</td>
<td>14</td>
<td>47%</td>
</tr>
<tr>
<td></td>
<td>Paper Copies</td>
<td>15</td>
<td>50%</td>
</tr>
<tr>
<td></td>
<td>Telephone</td>
<td>1</td>
<td>3%</td>
</tr>
</tbody>
</table>
Chapter Five

To be submitted to Pain Research & Management

A Pilot Study Assessing Pain, Health-Related Quality of Life, and Healthcare Use in Women after Cesarean Section

Elizabeth G Subocz, RN BScN; Elizabeth G VanDenKerkhof RN DrPH; Wilma M Hopman MA; Tanveer Towheed MSc FRCPC; Rosemary Wilson RN MN, PhD(c); David H Goldstein MSc FRCPC; Miu Lam, PhD; Margaret Harrison RN PhD; Shawna Johnston, MD FRCPC; James Medd, B.A.H., M.L.I.S

Funded by the Queen’s University Botterell Foundation

Send all correspondence to Elizabeth G. Van Den Kerkhof
Department of Anesthesiology, Kingston Ontario, Canada
76 Stuart Street
K7L 2V7
Phone: 613-549-6666 ext. 3964
Fax: 613-548-1375
Email: ev5@post.queensu.ca

Copyright © Elizabeth Gayle Subocz, September 2007
Summary

This pilot study examined pain and health-related quality of life (HRQOL) in 41 women after elective Cesarean section (c-section). Pain, HRQOL, and healthcare use were measured pre- and six weeks post-operatively. Of women approached, 84% consented, and 23% were lost to follow-up. Pain at six weeks was experienced by 23%, with 84% of women reporting physical components of HRQOL lower than Canadian norms and 53% of women reporting at least one healthcare provider visit for pain. Further research is needed to assess long-term pain and HRQOL after c-section.
Structured Abstract

Objectives: The purpose of this pilot study was to examine pain and health-related quality of life (HRQOL) outcomes and predictors after Cesarean section (c-section).

Methods: A consecutive convenience sample of 41 women consented to participate, completing the Brief Pain Inventory (BPI) and Health Survey Short-Form 36 (SF-36), and questionnaires on depression, anxiety, somatization, demographics, and healthcare use. A chart review provided procedural data. Six weeks after surgery, the BPI and SF-36 were completed a second time, along with a healthcare use questionnaire.

Results: Mild pain was reported by 23% (n = 7) of women sampled at six weeks, and was correlated with preoperative and acute pain scores. Physical dimensions of HRQOL were lower than population norms both pre- and post-operatively and associated with preoperative pain intensity and interference scores. The mean mental health dimension score was higher than matched norms preoperatively, and equal to these norms postoperatively. Depression and state anxiety were identified in approximately 20-25%, with analysis finding no link with postoperative pain. Almost all participants experienced moderate to severe acute postoperative pain which was association with long-term pain. Analgesics were infrequently used postoperatively; however, 33% of women reported at least 11 pain-related visits to healthcare professionals.
Discussion: Post-cesarean pain may continue to affect some women six weeks after surgery. Further research is needed to explore long-term pain after c-section and its possible impact on the individual and the healthcare system.

Keywords: chronic post-surgical pain, cesarean section, health-related quality of life, healthcare use
Introduction

Chronic Post-Operative Pain

Chronic post-operative pain (CPOP) is an adverse surgical outcome that has been reported as occurring after common surgical procedures. Variability exists in definitions of chronic pain. CPOP has been defined using variable time frames, however a common definition is pain beginning after a surgical experience that persists for at least two months in the absence of a clear, biological cause.\textsuperscript{1} Other researchers have defined long-term or CPOP as that which is present at six weeks after surgery.\textsuperscript{2} The International Association for the Study of Pain defines chronic pain more generally as that which persists beyond the normal healing trajectory.\textsuperscript{3}

CPOP after Cesarean Section

Chronic pain following Cesarean section (c-section) has been largely unreported to date, even though it was the mode of delivery for 23.7\% of births in Canada in 2003.\textsuperscript{4} A literature review of pain following c-section identified only two studies and two literature reviews of pain management specific to chronic pain after c-section. The two reviews examined acute pain management and highlighted the unique analgesic needs of the obstetric population with regards to newborn care. Both reviews also highlighted the lack of research following women into the weeks and months post-cesarean, but suggested a possible association between acute pain and the development of chronic pain.\textsuperscript{5-6}

One of the studies used a randomized controlled trial design to investigate the hypothesis that magnesium sulphate would improve pain outcomes. The sample of 120 women received either magnesium sulphate 50 mg/kg loading dose followed by 2g/h,
magnesium sulphate 25 mg/kg loading dose followed by 1g/h, or a placebo of normal saline both before and 24 hours after surgery. Pain was measured via a visual analogue scale during the postoperative period and six weeks after surgery. No difference in pain was reported postoperatively or at six weeks follow-up.\(^2\) Thus, intervention for long-term pain after cesarean has not been identified in the literature.

The second study was descriptive in nature, investigating pain outcomes at a mean of 10.2 months after surgery in a sample of 220 women. Six to 18 months after surgery, pain questionnaires were mailed and a chart review was conducted. At follow-up, pain was reported by 12.3% of the sample, with 5.9% of women rating this pain as moderate to severe and experienced at least every few days. Reports of persistent pain were associated with general anesthesia, presence of pain at other body sites, and higher recall of acute postoperative pain. Carrying a baby or other heavy object was often cited as a stimulus of pain and thus decreased quality of life.\(^7\)

*CPOP and Abdominal Surgery*

CPOP has been identified in numerous surgical populations including limb amputation, thoracotomy, breast surgery, cholecystectomy, inguinal hernia repair, and abdominal surgeries.\(^8-9\) Study design and time of follow-up is highly variable between studies, perhaps accounting for the variability in reported pain prevalence. Two large, retrospective, survey studies assessed reports of pain one year after abdominal surgery, with prevalence ranging from 12.3% to 32%.\(^10-11\) When pain outcomes of abdominal and vaginal surgery to correct uterovaginal prolapse were compared, those who underwent abdominal surgery had worse pain outcomes both in the acute postoperative period and six weeks later.\(^9\)
Prediction of CPOP

Although not addressed in the c-section population specifically, there are conflicting findings about the impact of psychological variables on acute pain outcomes for gynecologic procedures. An educational intervention was trialed in 346 inpatients with the goal of modifying anxiety. The results reported acute and chronic preoperative pain, trait anxiety, and depressive mood were associated with poor post-surgical pain outcomes.\textsuperscript{12} In a descriptive study of 80 women, it was state anxiety that was weakly correlated with postoperative pain.\textsuperscript{13} The potential associations between pain outcomes, and depressive mood and anxiety were supported by a prospective study of 85 women. Anxiety was associated with reports of pain between postoperative day (POD) two and ten, while depression was associated only on POD four.\textsuperscript{14}

Pain after abdominal surgery was also assessed for impact on quality of life. Using a qualitative design, 21 individuals were interviewed two weeks after surgery. Half of the participants reported physical limitations when entering/exiting bed and walking, and six reported difficulty with reaching. All participants reported activity limitations, most commonly bathing and self-care. Abdominal pain was reported by sixteen participants, incisional pain by 10 participants, and ‘other’ pain by 11 participants. Anxiety, depression, and feelings of helplessness and frustration were frequently expressed.\textsuperscript{15}

Quantitative research has also been used to explore quality of life. Health-related quality of life was measured four weeks after surgery in a sample of 88 surgical inpatients. The sample reported significantly lower scores of physical functioning, role performance, bodily pain, general health, vitality, and social functioning. This study also
explored healthcare use in this population. Four weeks postoperative, 41% of participants were still taking an analgesic. Visits to a doctor for pain proved impossible to distinguish from normal postoperative follow-up visits.¹⁶

Due to pain and its impact on HRQOL, post-surgical individuals may seek more medical care than those not experiencing these adverse outcomes. A cross-sectional survey addressed medication and healthcare use in 602 individuals with chronic pain. Prescription medications were used by 93%, non-prescription by 33%, physical treatments by 42%, and topical lotions by 35% of the sample. An additional 43% of participants were also receiving medication for concurrent anxiety, depression, and/or sleep disturbance problems. These individuals were seen frequently by a doctor, with 76 participants having seen a doctor at least once in the past four weeks, with 29% reporting three or more visits.¹⁷ Thus chronic pain poses a potential challenge for the healthcare system.

In conclusion, there is a paucity of research on the epidemiology and potential impact of CPOP on quality of life and healthcare burden after c-section. Thus, the purpose of this paper is to:

1. Describe what proportion of women report pain prior to c-section
2. Describe what percentage of women report pain at six weeks after c-section surgery
3. Describe healthcare services accessed for pain before and after c-section
4. Provide a preliminary analysis of correlation between chronic pain six weeks after c-section and preoperative pain, HRQOL, depression, anxiety, somatization, healthcare use, or demographic and/or procedural details.
Materials and Methods

Ethics

Ethics approval was received from the Health Sciences Research Ethics Board of Queen’s University prior to the study’s commencement.

Recruitment and Sample

The population of interest was women undergoing elective c-section. The sampling frame used to identify potential participants was the operating room schedule of an Eastern Ontario Hospital. Women were approached for the study if they were age 18 years or older and able to speak, read, and write in English. Due to scheduling issues, data collection occurred over two periods, July to October 2006 and February to March 2007. Women were approached after arrival on the labour and delivery unit, two hours prior to their scheduled c-section. Fifty-five eligible women were identified however six were not approached due to a late arrival on the ward restricting the time needed for these women to give informed consent and complete preoperative questionnaires. Of the 49 women approached, 41 consented, however, one participant withdrew from the study after completing the initial questionnaires and one participant underwent a hysterectomy with fetal demise. Hence, preoperative data are available on 41 women, however, only 39 participants were followed-up and had their charts reviewed. Due to the pilot nature of the study 40 participants was considered an adequate sample for the purpose of this study.

Data Collection and Design

A computerized database was constructed for the purpose of the study to allow for online data collection. The database was password protected and kept behind the hospital
firewall. Consenting women were offered the choice of preoperative questionnaires via tablet or paper copies, except in five instances where only paper copies were offered due to server difficulties.

Preoperatively, data on pain, HRQOL, healthcare use, depression, anxiety, somatization, and demographics were collected. As participant responses to the online questionnaires were entered into the database by each participant, no additional data entry was required. If the participant selected paper copies, their information was manually added to the database by the researcher. After completing the questionnaires, each participant was given a package containing a copy of their signed consent form, an outline of the study with the researcher’s contact information and guidelines for online follow-up, and a healthcare use and symptom journal as a tool to record healthcare use.

Six weeks postoperatively, email addresses collected preoperatively on the demographics questionnaire (Appendix D) were used to send out automated emails. These emails contained the participant’s unique login and the study’s website address for the completion of questionnaires on pain, HRQOL, and healthcare use. If an email address was not provided or there was no response to the automated email, the participant was contacted by telephone. Participants were offered the questionnaires via email, postal mail or telephone, and were contacted up to three times before considered lost to follow-up. A contact log for each participant was located within the database to track prior communication. In the case that an email was returned as undeliverable, a package with both paper copies and website and login information was mailed.

A chart review was conducted gathering health and obstetrical history as well as procedural details (Appendix C). A field journal recorded important observations.
preoperatively, and comments made by participants in person preoperatively and over the telephone postoperatively.

*Questionnaires*

Pain was measured by the Brief Pain Inventory (BPI). The BPI Long Form (BPI-LF) was used preoperatively as it collects both demographic and pain data. The BPI-LF measures pain over the past week, capturing pre-existing painful conditions such as headaches (Appendix E). The BPI Short Form (BPI-SF) was used to collect pain information postoperatively, and captures pain over the past 24 hours (see Appendix F). Two scores are generated from the BPI: pain intensity and pain interference. According to the literature, a score of <3/10 is considered “mild”, 4-6/10 “moderate” and 7-10/10 “severe” pain.\(^{17}\) Although originally developed to measure malignant pain, the BPI has been validated in populations experiencing chronic non-malignant pain and has been used to measure pain interference over time.\(^{18,19}\)

To capture the general pain experience, the bodily pain score from the SF-36 was used both pre- and post-operatively (Appendix G). This score, in contrast to pain scores from the BPI, measures pain over the past four weeks.

Current definition of chronic pain varies in the literature, from six weeks to three months. Due to the pilot nature of this study, pain present at six weeks was considered chronic. The presence of pain was measured by item one on the BPI-SF which asks “Throughout our lives, most of us have had pain from time to time (such as minor headaches, sprains, toothaches). Have you had pain other than these everyday kinds of pain today?” (Appendix F).
HRQOL was captured using the Health Survey Short Form 36 (SF-36) (Appendix G). Eight dimensions are scored by this instrument: physical functioning, role limitations, bodily pain, social functioning, mental health, emotion-imposed limitations, vitality, and general health perceptions. All dimensions are scored on a 0-100 scale, with a higher number representing a better health state. Two composite scores are formed from this questionnaire: the mental component scale score (MCS) and the physical component scale score (PCS). This tool’s validity has been tested in the general United States population, and its validity and reliability has been tested in chronic back pain, and female surgical populations.

The Center for Epidemiological Studies Depression Scale (CES-D) was used to measure depressive mood (see Appendix J). It has been deemed reliable and valid in many populations, and has been used in obstetric and chronic pain populations. Reliability and validity have been tested in the general population with an alpha of 0.85. Possible scores range from zero to 60, with a score of 16 or greater indicating significantly depressed mood.

Anxiety, as measured by the State Trait Anxiety Inventory (STAI), is measured with two scores identifying both situation-specific (i.e. state) and general (i.e. trait) anxiety scores (Appendix K). This instrument has been used previously to assess anxiety in obstetric and female, pre-surgical populations. For this study, scores of 45 or greater will be indicative of “high” anxiety as reported in the literature.

Somatization was measured with the Seven Symptom Screen Test (SSST), which inquires after seven general symptoms such as trouble breathing, pain in fingers and toes,
and frequent vomiting (see Appendix L). Seven physical symptoms has been reported as the cutoff for suspecting somatization in the literature.27

Pre- and post-operative healthcare use was measured by the Pre-Surgical Health Care Utilization Form and Six-Week Post-Surgical Health Care Utilization Form, respectively (Appendices H and I). These questionnaires have been recently developed for measuring healthcare use related to surgical pain,16 and have been used to collect information on healthcare visits and medication use. Additional variables captured by these questionnaires include interference with work and activities and satisfaction with pain control. These questionnaires have been piloted in surgical populations.

Analysis

All statistical analysis was done using SPSS version 14. Data were graphed and found to have a non-normal distribution, thus non-parametric tests were used. Means, in addition to medians, are presented for continuous scores despite non-normal distribution for the purpose of comparing this data with the literature. All tests of correlation were two-tailed with significance set at p < .05. Table 3.1 summarizes the distribution and categorization of the instruments’ scores. Due to the pilot nature of this study, cells with a frequency less than five were not collapsed thereby maintaining maximum information for the development of future studies.

Descriptive Analysis

The relevant instrument scoring instructions were used to describe the study population in terms of mean preoperative pain, HRQOL, depression, state and trait anxiety, and somatization using instrument scoring instructions. Pain expectancy was captured by an 11-point numeric rating scale on the Pre-Surgical Health Care Utilization
Form and thus required no scoring. Percentages were used to describe the population in terms of the categorized variables and scores with their distribution outlined in Table 3.1.

Healthcare use was described in terms of total number of visits to a health professional, and type of analgesic being used. Due to the large variability in the data, number of healthcare visits was categorized. Analgesics were categorized based on type of medication. Both of these categorized variables are presented as frequencies and percentages.

Postoperative Pain

The main outcome variable was postoperative pain at six weeks, as measured by response to the BPI-SF’s item asking whether pain had been experienced in the past 24 hours. Additional data on postoperative pain was collected by the pain intensity and interference scores from the BPI-SF measuring pain over the past 24 hours and the bodily pain scores from the SF-36 which measure pain over the preceding four weeks. Where possible, the non-parametric or small sample size version of statistical tests was used due to the small sample size of this study which violated the assumptions of most standard statistical tests. Categorical covariates and outcomes were tested for statistical significance using the chi square test. For example, preoperative categorical covariates were analyzed against postoperative pain (yes/no) using Chi square. The Kruskal-Wallis H test was used to investigate associations between postoperative pain scores and covariates such as preoperative demographic and surgical characteristics, and categorized depression, and state and trait anxiety scores. Continuous covariates such as MCS and PCS scores, and raw depression, state and trait anxiety, and somatization and pain expectancy scores were correlated with postoperative pain scores using the Spearman’s
Rank Order Correlation. Paired data, such as pre- and post-operative categorized pain scores were compared using a Wilcoxon Matched Pair test.

*Postoperative HRQOL*

The secondary outcome variable was HRQOL as captured by the MCS and PCS component scores of the SF-36. A Kruskal-Wallis H test was used to explore associations of preoperative and postoperative categorical covariates with mean MCS and PCS scores. Correlations between continuous preoperative and postoperative covariates and continuous postoperative MCS and PCS scores were tested by Spearman’s Rank Order Correlation.

*Postoperative Healthcare Use*

Healthcare use as an outcome variable was captured by total visits to a health professional. Number of reported postoperative healthcare visits was highly variable, thus visits were categorized to form three groups. A Chi Square test was used to compare categorical preoperative variables such as depressive mood (yes/no) and categorized total healthcare visits. A Kruskal-Wallis H test was used to explore associations between categorized preoperative variables with the continuous total healthcare visits score. For example, categorized state anxiety scores were compared with total postoperative visits. Associations between continuous preoperative variables such as pain expectancy were examined by Spearman’s Rank Order Correlation. Pre- and post-operative total healthcare visits were compared using the Wilcoxon Matched Pair test to account for the pairing of data.
Results

Sample Description

Of the 49 women approached, 41 women consented for a participation rate of 84%. At time of follow-up, one woman had withdrawn due to the time requirement of newborn care, one woman was unable to be reached and one woman’s postoperative data was removed from the analysis due to her additional surgical experience of hysterectomy. Seven women did not complete online questionnaires or return mailed paper copies. The participant undergoing hysterectomy in addition to c-section had completed follow-up questionnaires. Her data were included in the preoperative descriptive analysis, but her chart review and follow-up data were removed before analysis by the student researcher. Thus the total sample of 41 women was used to calculate that 22% of participants were lost to follow-up.

The sample was fairly homogenous with 40 of the 41 participants reporting white or Caucasian racial heritage. Average age was 31 years, with a range of 20 to 42 years. For most women, this was not their first child with number of previously born children ranging from one to three (Table 5.1). Surgical details were also consistent between participants, and are presented in Table 5.1.

Preoperative Pain Beliefs, Depression, Anxiety, and Somatization

Almost half of the sample expected moderate pain one week after surgery, with over 60% of women expected mild pain after six weeks. High depression scores were identified in almost 25% of participants, and high state and trait anxiety scores were reported by 22% and 7.3% of participants, respectively. No participants selected all seven symptoms on the SSST (Table 5.1).
Pain

In the preoperative period, 18 (44%) women reported pain during the past week. Although 18 participants reported pain during the past week, 20 women completed the items used to generate pain intensity and pain interference scores. The average preoperative pain intensity mean was 3.0/10 (95% Confidence Interval [CI]: 2.0-4.0) and the mean pain interference score was of 3.6/10 (95% CI: 2.4-4.9). Forty-one women reported bodily pain scores with a mean of 65 (95% CI: 56–73) over the past four weeks (Table 5.2), which is significantly lower than the age- and sex- matched Canadian mean of 75 (95% CI: 72-78).28

Thirty-four of the 39 reviewed patient charts provided information about pain in the post-anesthesia care unit (PACU). Pain scores remained low with a mean pain score of 1.9/10 (95% CI: 1-3). Reports of pain increased on the surgical unit with almost 40% of women reporting severe pain (Table 5.2).

Six weeks postoperatively, seven participants (23%) reported pain within the past 24 hours. One participant denied pain within the past 24 hours, but indicated pain on the intensity and interference questions. Pain intensity ratings were highly variable with scores ranging from zero to 6.8, with a mean of 2.3 (95% CI: 0.4-4.2). Pain interference scores were also highly variable, averaging 2.6 (95% CI: 0.1-5.2), with a minimum score less than one and a maximum score of ten. Thirty-one participants completed the SF-36 postoperatively. Mean postoperative bodily pain score from the SF-36 decreased from the preoperative period to a mean of 60 (95% CI: 51-69) (Table 5.1), remaining significantly lower than the matched Canadian norm of 75 (95% CI: 72-78).28
All preoperative variables as well as acute postoperative pain were analyzed for a relationship with pain at six weeks. The findings are presented in Table 5.3.

Women undergoing concurrent tubal ligation were more likely to report pain six weeks after surgery. Somatization scores were negatively correlated with bodily pain scores, however no participant reached a score on the SSST that would indicate possible somatization. Thus, the tendency to somatize, as distinct from true somatization, was associated with bodily pain in the second to sixth week after surgery. Preoperative pain interference scores were negatively correlated with bodily pain scores at six-weeks after surgery. Thus, as pain interference scores increased preoperatively, poorer postoperative bodily pain scores were reported.

Reports of severe acute postoperative pain were associated with the presence of pain at six weeks. Further defining this relationship, acute postoperative pain ratings were negatively correlated with bodily pain scores at six weeks. Thus, increased severity in acute pain was correlated with increased severity in bodily pain scores at six weeks (Table 5.3).

Health-Related Quality of Life

Postoperatively, a mean PCS score of 47 (95% CI: 44-50) and mean MCS score of 48 (95% CI: 44-51) were reported.

Table 5.5 presents the variables associated with HRQOL outcomes. Postoperative MCS scores were positively correlated with preoperative scores. Postoperative PCS scores were associated with preoperative pain.
Healthcare Use

Preoperatively, 23 women (66%) sought medical care due to pain, with 13 participants (37%) reporting four or more visits. Preoperative satisfaction with pain control was measured with seven women (18%) completely satisfied, 11 women (28%) were somewhat satisfied, and three women (7.5%) were completely dissatisfied. At six weeks, 24 (80%) participants were no longer using the analgesics prescribed at hospital discharge. The self-reported medication use is presented in Table 5.6.

According to the 37 charts containing copies of the discharge form, five women (14%) received no analgesic prescription or advice as captured by the chart copy of the discharge form and prescription. For those women who received prescriptions and/or were recommended non-prescription analgesics, the results are summarized in Table 5.6.

At the six week follow-up, six women (15%) reported using an analgesic in the past week, with three women (n = 7.3%) identifying the need for daily pain medication. Fifteen women (36.6%) used alternative methods of pain relief, the most common being relaxation techniques (n = six, 14.6%) and warm compresses (n = 4, 9.8%).

Variables associated with postoperative healthcare use are presented in Table 5.5. Women with preoperative trait anxiety were more likely to report frequent healthcare visits. Analysis reported no other association between preoperative variables and postoperative healthcare visits. Total healthcare visits increased with six-week postoperative bodily pain scores.
Discussion

The results of this study help to describe the elective c-section population in terms of pain, post-surgical pain expectancies, HRQOL, and psychological variables in the period just prior to surgery.

The number of women with CES-D scores indicating depression was higher than expected. The high scores on this instrument may be due to the nature of its questions and their overlapping with the experience of being pregnant rather than indicative of true depression. Thus, the finding of depression in this sample may be neither accurate nor comparable to other populations.

The pattern of postoperative PCS and MCS scores in relation to population norms is similar to that observed in a prior prospective pilot study of 88 surgical inpatients. In the pilot study of surgical inpatients, medication use was also measured with 41% of the sample reporting analgesic use four weeks after surgery.\(^{16}\) Analgesic use in this thesis study’s sample was lower than the previously mentioned pilot study of surgical inpatients, which was an expected finding, as reviews of pain management post-cesarean have highlighted the special needs of new mothers with regards to medication side effects and passage through breast milk.\(^{5-6}\)

The finding that acute pain may be associated with reports of long-term pain supports previous study results of post-cesarean pain. Two reviews of acute post-cesarean pain management suggested that poorly managed acute pain may extend into chronic pain.\(^{5-6}\) A retrospective study of 220 women reported an association between recall of acute pain and reports of pain at a mean follow-up of 10.2 months post-cesarean.\(^{7}\)
The role of anxiety in the postoperative experience of pain was not supported by the results of this study. Likewise, depression was not identified as a correlate of pain outcomes. Caution is needed in interpreting this pilot study’s results, however, as anxiety and depression may play a role in pain outcomes that was undetected in this study’s small sample size.

With few studies addressing long-term post-cesarean pain, this pilot study provided preliminary data on the pain experience of women six weeks after c-section. The effect of pain, along with other preoperative variables, was captured through HRQOL, which also explored the experience of women in the weeks following c-section. The prospective design and journal allowed for issues of accessing the planned c-section population to be explored and minimized errors in participant recall of preoperative and acute pain.

The results of this study are limited by its sample. A convenience sampling method was considered adequate to meet the pilot nature of this study however this sample may not be representative of the larger elective c-section population. The study sample may be biased towards women with lower anxiety levels as non-participants cited anxiety as a reason for not wishing to participate. Thus, the description of the study sample may not correctly represent true anxiety as experienced by women two hours prior to elective c-section. The size of the sample is also a limitation, as it is not powered to answer questions of correlation. The results and their significance are given, however, for generating hypotheses for future study.

The results of this study indicate that long-term pain may affect some women post-cesarean. Previously cited correlates of postoperative pain were identified in this
sample, presenting possible preoperative or acute postoperative means of preventing or improving postoperative pain. Future studies should note that accessing women in the two-hour window between admission and surgery resulted in some women not being approached due to scheduling, and the six week follow-up period is a very busy time for new mothers as depicted by the 22% of the sample lost to follow-up and the difficulty of completing online questionnaires. Pain-related visits to a health professional provided a preliminary assessment of this population’s need of improved pain management.

In conclusion, the elective c-section population is accessible for descriptive research, with long-term pain and physical aspects of HRQOL presenting as possible problems during the six weeks after c-section. Pain-related visits to healthcare providers also supported the problem of postoperative pain and the potential healthcare burden it presents. This study’s results highlight the need for research exploring the experience of long-term postoperative pain and HRQOL after elective c-section as the problem of pain may be felt by both individuals and the healthcare system.
Acknowledgements

Funding for this study was provided by the Queen’s University Botterell Foundation. Student support was provided by the Freda Paltiel Award, Faculty Award for Graduate Students in Nursing, Queen’s University/Ontario Graduate Scholarship in Science and Technology, and Queen’s Graduate Award.
References


Table 5.1. – Univariate Analysis of Preoperative Demographic, Psychological, and Clinical Characteristics, Health-Related Quality of Life, and Healthcare Use of Study Sample

<table>
<thead>
<tr>
<th>Variable (n)</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographic Characteristics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married (40)</td>
<td>34</td>
<td>85</td>
</tr>
<tr>
<td>Have Other Children (38)</td>
<td>30</td>
<td>79</td>
</tr>
<tr>
<td>Age (40)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-29 years</td>
<td>13</td>
<td>33</td>
</tr>
<tr>
<td>30-34 years</td>
<td>19</td>
<td>48</td>
</tr>
<tr>
<td>35+ years</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>Highest Level of Education: (40)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade 9-13, without diploma</td>
<td>5</td>
<td>13</td>
</tr>
<tr>
<td>High school diploma</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Trade/professional certificate or diploma</td>
<td>15</td>
<td>38</td>
</tr>
<tr>
<td>Some university</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Undergraduate degree</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>Post-graduate degree</td>
<td>9</td>
<td>23</td>
</tr>
<tr>
<td>Job Status (41)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed outside the home, full-time</td>
<td>24</td>
<td>59</td>
</tr>
<tr>
<td>Employed outside the home, part-time</td>
<td>5</td>
<td>12</td>
</tr>
<tr>
<td>Homemaker</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>Unemployed</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Variable (n)</td>
<td>Frequency</td>
<td>Percent</td>
</tr>
<tr>
<td>--------------------------------------------------</td>
<td>-----------</td>
<td>---------</td>
</tr>
<tr>
<td><strong>Job Status (41) continued</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>6</td>
<td>15</td>
</tr>
<tr>
<td><strong>Clinical Characteristics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Prior Abdominal Surgery: (39)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No prior surgery</td>
<td>8</td>
<td>21</td>
</tr>
<tr>
<td>Prior non-c-section surgery</td>
<td>5</td>
<td>13</td>
</tr>
<tr>
<td>Prior c-section +/- other surgery</td>
<td>26</td>
<td>67</td>
</tr>
<tr>
<td><strong>Used Prior Incision Site: (14)</strong></td>
<td>11</td>
<td>79</td>
</tr>
<tr>
<td><strong>Anesthetic Technique: (39)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spinal</td>
<td>38</td>
<td>97</td>
</tr>
<tr>
<td>Spinal + Epidural</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td><strong>Pfannensteil Incision Closure: (38)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dissolving Stitches</td>
<td>25</td>
<td>66</td>
</tr>
<tr>
<td>Staples</td>
<td>12</td>
<td>32</td>
</tr>
<tr>
<td>Adhesive</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td><strong>Tubal Ligation (39)</strong></td>
<td>12</td>
<td>31</td>
</tr>
<tr>
<td><strong>Psychological Characteristics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>1-Week Pain Expectancy (40)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild</td>
<td>10</td>
<td>24</td>
</tr>
<tr>
<td>Moderate</td>
<td>20</td>
<td>49</td>
</tr>
<tr>
<td>Severe</td>
<td>11</td>
<td>27</td>
</tr>
<tr>
<td>Variable (n)</td>
<td>Frequency</td>
<td>Percent</td>
</tr>
<tr>
<td>--------------------------------------------------</td>
<td>-----------</td>
<td>---------</td>
</tr>
<tr>
<td>6-week pain expectancy (40)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>11</td>
<td>27</td>
</tr>
<tr>
<td>Mild</td>
<td>25</td>
<td>61</td>
</tr>
<tr>
<td>Moderate</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>Severe</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Depressive Mood (score &gt; 15) (40)</td>
<td>10</td>
<td>24</td>
</tr>
<tr>
<td>High Anxiety (score &gt; 44) (40)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>State</td>
<td>9</td>
<td>22</td>
</tr>
<tr>
<td>Trait</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Total Healthcare Visits in Past Six Months (35)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 visits</td>
<td>12</td>
<td>34</td>
</tr>
<tr>
<td>1-3 visits</td>
<td>10</td>
<td>29</td>
</tr>
<tr>
<td>4+ visits</td>
<td>13</td>
<td>37</td>
</tr>
<tr>
<td>Preoperative Analgesic Use (41)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>25</td>
<td>61</td>
</tr>
<tr>
<td>Acetaminophen</td>
<td>14</td>
<td>34</td>
</tr>
<tr>
<td>Acetylsalicylic Acid</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Morphine</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Continuous Variables</td>
<td>Mean (Median)</td>
<td>95% CI*</td>
</tr>
<tr>
<td>Somatization Score (40)</td>
<td>1.1 (1.0)</td>
<td>0.7 – 1.5</td>
</tr>
<tr>
<td>1-week Pain Expectancy</td>
<td>5.1 (5.0)</td>
<td>4.4 – 5.7</td>
</tr>
<tr>
<td>6-week Pain Expectancy</td>
<td>1.6 (1.0)</td>
<td>1.0 – 2.2</td>
</tr>
<tr>
<td>Variable (n)</td>
<td>Frequency</td>
<td>Percent</td>
</tr>
<tr>
<td>------------------------------------</td>
<td>-----------</td>
<td>---------</td>
</tr>
<tr>
<td>Depression Score</td>
<td>12 (10)</td>
<td>9.3 – 15</td>
</tr>
<tr>
<td>State Anxiety Score</td>
<td>36 (39)</td>
<td>34 – 39</td>
</tr>
<tr>
<td>Trait Anxiety Score</td>
<td>33 (31)</td>
<td>30 – 35</td>
</tr>
<tr>
<td>HRQOL Mental Component Score</td>
<td>53 (53)</td>
<td>50 – 55</td>
</tr>
<tr>
<td>HRQOL Physical Component Score</td>
<td>43 (41)</td>
<td>39 – 46</td>
</tr>
</tbody>
</table>

* CI = Confidence Interval

Note: pain expectancy categories, no pain = 0, mild pain = 1-3, moderate pain = 4-6, severe pain = 7-10. Agreement with pain statement based on six-point scale, with never = 0, sometimes = 1-3, most of the time = 4-5, and always = 6.
Table 5.2. – Pain Pre- and Post-Operatively and Six Weeks After Surgery

<table>
<thead>
<tr>
<th>Variable (n)</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Preoperative Pain</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pain in Past Week (yes/no) (41)</td>
<td>18</td>
<td>44</td>
</tr>
<tr>
<td><strong>Acute Postoperative Pain</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highest Pain in PACU: (34)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild</td>
<td>25</td>
<td>73</td>
</tr>
<tr>
<td>Moderate</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>Severe</td>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td>Highest Pain on Ward: (37)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild</td>
<td>5</td>
<td>13</td>
</tr>
<tr>
<td>Moderate</td>
<td>17</td>
<td>48</td>
</tr>
<tr>
<td>Severe</td>
<td>15</td>
<td>40</td>
</tr>
<tr>
<td><strong>Six-Week Postoperative Pain</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pain in Past 24 Hours (yes/no) (30)</td>
<td>7</td>
<td>23</td>
</tr>
<tr>
<td><strong>Preoperative Continuous Variables</strong></td>
<td>Mean (Median) 95%CI*</td>
<td></td>
</tr>
<tr>
<td>Pain Intensity in Past Week (20)</td>
<td>3.0 (2.5)</td>
<td>2 – 4</td>
</tr>
<tr>
<td>Pain Interference in Past Week (20)</td>
<td>3.6 (3.9)</td>
<td>2.4 – 4.9</td>
</tr>
<tr>
<td>Bodily Pain Score (41)</td>
<td>63 (62)</td>
<td>55 – 71</td>
</tr>
<tr>
<td><strong>Acute Postoperative Continuous Variables</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highest Pain in PACU (34)</td>
<td>1.9 (0)</td>
<td>1.0 – 2.9</td>
</tr>
<tr>
<td>Highest Pain on Ward (37)</td>
<td>6 (6)</td>
<td>5.2 – 6.7</td>
</tr>
<tr>
<td><strong>Six Week Postoperative Continuous Variables</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preoperative Continuous Variables</td>
<td>Mean (Median)</td>
<td>95%CI*</td>
</tr>
<tr>
<td>-----------------------------------------------------------------------</td>
<td>---------------</td>
<td>--------</td>
</tr>
<tr>
<td>Pain Intensity in Past 24 Hours (7)</td>
<td>2.3 (1)</td>
<td>0.4 – 4.2</td>
</tr>
<tr>
<td>Pain Interference in Past 24 Hours (7)</td>
<td>2.6 (1)</td>
<td>0.1 – 5.2</td>
</tr>
<tr>
<td>Bodily Pain in Past Four Weeks (31)</td>
<td>60 (52)</td>
<td>51 – 69</td>
</tr>
</tbody>
</table>

* CI = Confidence Interval
Table 5.3. – Bivariate Analysis of Independent Preoperative and Acute Postoperative Characteristics and Pain at Six Weeks After Surgery

<table>
<thead>
<tr>
<th>Preoperative/Acute Independent Variable (n)</th>
<th>Statistical Test</th>
<th>X²</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Postoperative Pain Present at Six Weeks (yes/no)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td>0.82</td>
<td>0.66</td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td>0.19</td>
<td>0.67</td>
</tr>
<tr>
<td>Education Level</td>
<td></td>
<td>1.52</td>
<td>0.82</td>
</tr>
<tr>
<td>Job Status</td>
<td></td>
<td>4.85</td>
<td>0.30</td>
</tr>
<tr>
<td>Prior Abdominal Surgery</td>
<td></td>
<td>0.72</td>
<td>0.70</td>
</tr>
<tr>
<td>Method of Incision Closure</td>
<td></td>
<td>3.73</td>
<td>0.16</td>
</tr>
<tr>
<td>Tubal Ligation</td>
<td></td>
<td>4.2</td>
<td>.04*</td>
</tr>
<tr>
<td>Pain Expectancy (moderate to severe)</td>
<td></td>
<td>9.0</td>
<td>.01*</td>
</tr>
<tr>
<td>Depression (yes/no)</td>
<td></td>
<td>1.95</td>
<td>0.16</td>
</tr>
<tr>
<td>State Anxiety (yes/no)</td>
<td></td>
<td>0.19</td>
<td>0.67</td>
</tr>
<tr>
<td>Trait Anxiety (yes/no)</td>
<td></td>
<td>3.40</td>
<td>0.07</td>
</tr>
<tr>
<td>Preoperative Pain (yes/no)</td>
<td></td>
<td>1.97</td>
<td>0.16</td>
</tr>
<tr>
<td>Postoperative Acute Pain on Ward (severe)</td>
<td></td>
<td>9.3</td>
<td>0.01*</td>
</tr>
<tr>
<td>Postoperative Pain Intensity Score</td>
<td></td>
<td>z</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td>5.87</td>
<td>0.32</td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td>8.78</td>
<td>0.12</td>
</tr>
<tr>
<td>Education Level</td>
<td></td>
<td>6.46</td>
<td>0.26</td>
</tr>
<tr>
<td>Job Status</td>
<td></td>
<td>5.57</td>
<td>0.35</td>
</tr>
</tbody>
</table>
### Postoperative Pain Intensity Score

<table>
<thead>
<tr>
<th>Factor</th>
<th>z</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prior Abdominal Surgery</td>
<td>0</td>
<td>1.00</td>
</tr>
<tr>
<td>Method of Incision Closure</td>
<td>3.20</td>
<td>0.36</td>
</tr>
<tr>
<td>Tubal Ligation</td>
<td>0</td>
<td>1.00</td>
</tr>
<tr>
<td>Pain on Ward (mild/moderate/severe)</td>
<td>5.00</td>
<td>0.17</td>
</tr>
</tbody>
</table>

### Depression Score

<table>
<thead>
<tr>
<th>Factor</th>
<th>z</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depression Score</td>
<td>0.25</td>
<td>0.163</td>
</tr>
</tbody>
</table>

### State Anxiety Score

<table>
<thead>
<tr>
<th>Factor</th>
<th>r</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>State Anxiety Score</td>
<td>-0.84</td>
<td>0.09</td>
</tr>
</tbody>
</table>

### Trait Anxiety Score

<table>
<thead>
<tr>
<th>Factor</th>
<th>r</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trait Anxiety Score</td>
<td>-0.06</td>
<td>0.91</td>
</tr>
</tbody>
</table>

### Somatization Score

<table>
<thead>
<tr>
<th>Factor</th>
<th>r</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Somatization Score</td>
<td>0.29</td>
<td>0.53</td>
</tr>
</tbody>
</table>

### Pain Expectancy at Six Weeks Score

<table>
<thead>
<tr>
<th>Factor</th>
<th>r</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain Expectancy at Six Weeks Score</td>
<td>-0.03</td>
<td>0.95</td>
</tr>
</tbody>
</table>

### Postoperative Pain Interference Score

<table>
<thead>
<tr>
<th>Factor</th>
<th>z</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>7.20</td>
<td>0.41</td>
</tr>
<tr>
<td>Marital Status</td>
<td>8.00</td>
<td>0.66</td>
</tr>
<tr>
<td>Education Level</td>
<td>3.81</td>
<td>0.80</td>
</tr>
<tr>
<td>Job Status</td>
<td>8.52</td>
<td>0.29</td>
</tr>
<tr>
<td>Prior Abdominal Surgery</td>
<td>3.50</td>
<td>0.48</td>
</tr>
<tr>
<td>Method of Incision Closure</td>
<td>7.00</td>
<td>0.14</td>
</tr>
<tr>
<td>Tubal Ligation</td>
<td>0</td>
<td>1.00</td>
</tr>
<tr>
<td>Categorized Pain on Ward (mild/moderate/severe)</td>
<td>3.38</td>
<td>0.34</td>
</tr>
</tbody>
</table>

### Depression Score

<table>
<thead>
<tr>
<th>Factor</th>
<th>z</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depression Score</td>
<td>0.06</td>
<td>0.87</td>
</tr>
</tbody>
</table>

### State Anxiety Score

<table>
<thead>
<tr>
<th>Factor</th>
<th>z</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>State Anxiety Score</td>
<td>0.24</td>
<td>0.54</td>
</tr>
</tbody>
</table>
### Pain After Cesarean

<table>
<thead>
<tr>
<th></th>
<th>r</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trait Anxiety Score</td>
<td>0.01</td>
<td>0.98</td>
</tr>
<tr>
<td>Somatization Score</td>
<td>0.34</td>
<td>0.33</td>
</tr>
<tr>
<td>Pain Expectancy at Six Weeks Score</td>
<td>-0.04</td>
<td>0.93</td>
</tr>
<tr>
<td>Bodily Pain Score</td>
<td>z</td>
<td>P value</td>
</tr>
<tr>
<td>Depression (yes/no)</td>
<td>10.90</td>
<td>0.28</td>
</tr>
<tr>
<td>Trait Anxiety (yes/no)</td>
<td>6.75</td>
<td>0.66</td>
</tr>
<tr>
<td>State Anxiety (yes/no)</td>
<td>8.74</td>
<td>0.42</td>
</tr>
<tr>
<td>Pain Expectancy at Six Weeks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(mild/moderate/severe)</td>
<td>5.17</td>
<td>0.82</td>
</tr>
<tr>
<td>Acute Postoperative Pain on Ward</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(mild/moderate/severe)</td>
<td>9.33</td>
<td>0.32</td>
</tr>
<tr>
<td></td>
<td>r</td>
<td>P value</td>
</tr>
<tr>
<td>Depression Score</td>
<td>-0.16</td>
<td>0.39</td>
</tr>
<tr>
<td>Trait Anxiety Score</td>
<td>-0.03</td>
<td>0.90</td>
</tr>
<tr>
<td>State Anxiety Score</td>
<td>-0.32</td>
<td>0.86</td>
</tr>
<tr>
<td>Somatization Score</td>
<td>-0.48</td>
<td>0.01*</td>
</tr>
<tr>
<td>Pain Expectancy at Six Weeks Score</td>
<td>-0.03</td>
<td>0.88</td>
</tr>
<tr>
<td>Pain Intensity Score</td>
<td>-0.34</td>
<td>0.23</td>
</tr>
<tr>
<td>Pain Interference Score</td>
<td>-0.59</td>
<td>0.03*</td>
</tr>
<tr>
<td>Bodily Pain Score</td>
<td>0.59</td>
<td>0.34</td>
</tr>
<tr>
<td>Postoperative Acute Pain on Ward Score</td>
<td>-0.42</td>
<td>0.02*</td>
</tr>
</tbody>
</table>

* = significant at p < .05
Table 5.4. – Bivariate Analysis of Characteristics Associated With HRQOL Six Weeks After Surgery

<table>
<thead>
<tr>
<th>Correlated Variables (n)</th>
<th>r</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preoperative Mental Component Score (39) * Postoperative Mental Component Score (31)</td>
<td>.69</td>
<td>&lt; .01</td>
</tr>
<tr>
<td>Preoperative Pain Intensity Score (20) * Postoperative Physical Component Score (31)</td>
<td>-.56</td>
<td>.04</td>
</tr>
<tr>
<td>Preoperative Pain Interference Score (20) * Postoperative Physical Component Score (31)</td>
<td>-.59</td>
<td>.03</td>
</tr>
</tbody>
</table>
Table 5.5. – Postoperative Healthcare Use of Study Sample

<table>
<thead>
<tr>
<th>Variable (n)</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Visits (30)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 visits</td>
<td>14</td>
<td>47</td>
</tr>
<tr>
<td>1-10 visits</td>
<td>6</td>
<td>20</td>
</tr>
<tr>
<td>&gt;10 visits</td>
<td>10</td>
<td>33</td>
</tr>
<tr>
<td>Analgesic Use (30)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>24</td>
<td>80</td>
</tr>
<tr>
<td>Non-opioid</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Non-opioid + opioid</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>Not specified</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Continuous Score</td>
<td>Mean (Median)</td>
<td>95% CI</td>
</tr>
<tr>
<td>Total Visits (30)</td>
<td>1.34 (0)</td>
<td>0.12 – 2.57</td>
</tr>
</tbody>
</table>
Table 5.6. – Bivariate Analysis of Characteristics Associated With Healthcare Visits Six Weeks After Surgery

<table>
<thead>
<tr>
<th>Independent Variable (n)</th>
<th>Frequency (%)</th>
<th>Statistical Test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>X²</td>
</tr>
<tr>
<td>Correlation with Preoperative Visits</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preoperative Trait Anxiety (40)</td>
<td>3 (7)</td>
<td>28</td>
</tr>
<tr>
<td>Correlation with Postoperative Visits</td>
<td></td>
<td>r</td>
</tr>
<tr>
<td>Postoperative Bodily Pain (31) * Postoperative Visits in Past Six Weeks (30)</td>
<td>-.57</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>Postoperative Physical Component Score (31) *</td>
<td></td>
<td>-.39</td>
</tr>
<tr>
<td>Postoperative Visits in Past Six Weeks (30)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CHAPTER SIX

Overview of Findings

This thesis highlights some potential issues when studying pain and health-related quality of life (HRQOL). Online data collection was trialed, and a descriptive analysis of the planned cesarean section (c-section) population and their reported pain, HRQOL, and healthcare use was provided. Data on possible predictors of poor pain and HRQOL outcomes, thought limited by a small sample size, were presented for the purpose of hypothesis development.

The literature review in chapter two provided both context and guidance for the study described in chapter three. The review indicated that chronic post-operative pain (CPOP) has been identified after various surgical procedures, but has been studied in relation to c-section in few studies to date. Post-cesarean pain has been addressed by one randomized controlled trial of 120 women with reports of mild pain reported by 18% of women six weeks after surgery (Doherty, Magann, Newnham, Paech, & Verity, 2006). One descriptive study measured pain three months after c-section in 220 women with 16% of the sample reporting pain (Jensen, Kehlet, Nikolajsen, & Sørensen, 2004).

With what is known about abdominal surgery populations, persistent postoperative pain in the absence of infection or other clear biological cause may be associated with preoperative and acute pain (Jensen, et al. 2004) or psychological characteristics (Buckley, Pavlin, Penaloza, & Pharm, 2004). Further study on the prevention of chronic pain is necessary due to the potential for women with adverse pain outcomes after surgery to have increased healthcare needs (Dukes, McDermott,

The results indicated that women were both accessible and willing to participate in a descriptive study of pain and HRQOL outcomes prior to a planned c-section. Accessibility was dependent on women arriving at the hospital two hours prior to time of surgery. Anxiety and wanting to spend that time with their family was the most common reason given by women for declining participation in the study. Almost all participants preferred to enter initial data by computerized tablet. The results of accessibility and preference of questionnaire format at six weeks follow-up were much different than preoperative findings. The majority of women needed reminder telephone calls to complete follow-up, with an equal number of women preferring online and paper copies of the questionnaires. The decision to use paper questionnaires postoperatively was a surprising finding due to 85% of women reporting online access during preoperative data collection.

The chart review revealed that many elements of the procedure itself were standardized between participants, including anesthetic, type of incision, and type of incision closure. Most women had already undergone a c-section for a prior delivery, but use of the previous incision was not well recorded in the charts. The results of the chart review suggested that reports of acute pain in the PACU are very different than pain reported on the ward. Minimal pain was reported by women in the PACU, however most women experienced pain of moderate to severe intensity while on the ward.

Descriptive analysis of the preoperative questionnaires suggested a fairly homogenous sample with regard to demographics. This made analysis of the role of
demographics in postoperative outcomes difficult. Depression and state and trait anxiety were present preoperatively in this sample. No participant reported a somatization score indicative of a true tendency to somatize. Women expected pain one week after surgery, however, many women expected pain to resolve by six weeks postoperative. Preoperative pain intensity and interference were rated as mild. The mean of HRQOL physical component scale scores was lower than age- and sex-matched Canadian norms, while the mean mental component scale score was higher than the norm.

Six weeks postoperative, pain was reported by seven participants (23%) and was rated as mild in both intensity and interference. The mean HRQOL physical composite score was still lower than matched Canadian norms, but had increased from the preoperative score. The mean mental composite score of HRQOL was lower than the preoperative mean score, but was within the expected range for this sample’s age and sex.

Preoperative pain was managed through both analgesics and alternative methods of pain control such as using heat. Over half of the sample had sought medical care due to preoperative pain. Most women cited partial satisfaction with preoperative pain control. Postoperatively, approximately half of the women had sought medical care for pain at least once.

True conclusions about predictors of postoperative pain and HRQOL outcomes could not be made due to the study’s small sample size however preliminary analyses were conducted to guide hypotheses for a larger study. These analyses suggested that pain and HRQOL outcomes were independent of demographic and surgical data with a possible association between tubal ligation and pain outcomes at six weeks. Higher scores of acute postoperative pain and preoperative pain expectancy, pain interference,
and somatization were associated with poorer pain outcomes at six weeks. The results of this study did not support a role of depression or anxiety in pain outcomes as identified in the literature review (Adamatti, et al, 2002; Allen, Brockbank, Carr, & Strike, 2006; Carr, Thomas, & Wilson-Barnet, 2005; Ferber, & Granot, 2005; Lin & Wang, 2005).

The results of correlational analysis identified few associations between preoperative variables and postoperative MCS and PCS scores. Preoperative MCS scores were positively correlated with postoperative MCS scores. Postoperative PCS scores were negatively correlated with preoperative pain intensity and pain interference scores.

Postoperative healthcare visits were associated with psychological and physical reports. Preoperative anxiety and postoperative pain and PCS scores were associated with postoperative medical visits.

Thus, the findings of the hypothesis-developing research question fit with the conceptual framework, which illustrates the interplay between multiple factors on the experience of symptoms and the resulting performance.

Strengths and Limitations

This study provides key organizational details for the effective design of a larger study to address chronic post-operative pain (CPOP) in the planned c-section population. Reports of online access and preference for mode of data collection provide insight for future researchers weighing the balance of cost and response rate. The preliminary analysis provides potential hypotheses for future research.

Limitations of this thesis include the small sample size which was not powered to answer the larger study question. The study sample also proved to have little variation with regards to demographic and procedural data, perhaps missing possible associations.
with pain outcomes. The convenience sampling method was considered adequate to meet the pilot nature of this study however this sample may not have been representative of the larger elective c-section population.

In measuring pain, depression, and anxiety, there exists the potential for a biased sample. With anxiety cited as a common reason for not participating, the women suffering from the greatest state and/or trait anxiety may not be included in the study sample. Likewise, women experiencing the most pain or other possible risks to HRQOL may have been less likely to respond to follow-up questionnaires.

Nursing Implications

From the findings of this study, the importance of the nurse in preoperative patient education and assessment and postoperative pain assessment, documentation, management, and advocacy is highlighted. As educators, nurses may be able to modify pain expectancy to improve long-term pain outcomes by preoperative education of the postoperative pain experience. Nurses also play a vital role in preoperative assessment of the surgical patient, allowing for possible screening of anxiety and depression, which were identified in the literature review as potential correlates of postoperative pain outcomes. Nurses, having extended exposure to hospital inpatients, are also in a position to modify the acute postoperative pain experience by pain assessment and documentation, management of analgesics ordered on an as needed basis, and patient education on proper use and timing of analgesics. Nurses may also act as advocates in the case where a patient’s acute postoperative pain is not being controlled with the ordered analgesics.
Conclusion and Recommendations

In conclusion, the planned c-section population is accessible for further studies of the presence, predictors, and impact of CPOP. Due to the homogeneity of the sample with regards to demographics and procedural details, a multi-site study may provide a more representative sample. From the reported rates of CPOP at three and six months after surgery, a longer follow-up period may be warranted to investigate if pain at six weeks resolves, remains constant, or worsens.

Online data collection had both advantages and disadvantages in this study. Tablet use reduced the number of confidential papers needing to be safely stored, and the time and potential errors in data entry by the student researcher. Postoperatively, online follow-up provided a quick method of data collection, but only half of the sample preferred this mode of follow-up. From the field note journal, comments of not having time to check email were common, requiring the student researcher to call several times and re-send the website and login information. Thus, the use of online data collection in the c-section population is limited with a follow-up period of six weeks.

Pain intensity and interference were correlated with physical component scale scores of HRQOL, thus preoperative pain intervention may improve long-term HRQOL following c-section, but requires future study to further define this potential relationship.

Other studies of CPOP after abdominal surgery suggest a role of both anxiety and depression in pain outcomes. Although state and trait anxiety and depression were not found to be correlated with pain outcomes in this thesis study, an existing relationship of these mental health characteristics with pain after c-section may not have been detected
by this study’s small sample size. Thus, the role of anxiety and depression in pain outcomes after c-section is another area for future investigation.

Measurement of pain-related healthcare use suggested that women experiencing adverse postoperative pain outcomes have additional healthcare needs. Healthcare needs during the weeks following a planned c-section may be modified by early intervention in possible correlates of postoperative pain such as anxiety and depression.
REFERENCES


Does magnesium sulphate reduce the short- and long-term requirements for pain
relief after caesarean delivery? A double-blind placebo-controlled trial.

*American Journal of Obstetrics & Gynecology, 194*(6), 1596-1602

(2006, February). The burden of neuropathic pain: Results from a cross-sectional


game players: Methodological issues. *Cyber Psychology & Behaviour, 7*(5),
511-518.


Van Den Kerkhof, E. G., Parlow, J. L., Goldstein, D., H., & Milne, B. (2004). In Canada, anesthesiologist are less likely to respond to an electronic, compared to a paper questionnaire. *Canadian Journal of Anesthesia, 51*, 449-454


APPENDICES

Appendix B. Conceptual Framework as Applied to Thesis Study

<table>
<thead>
<tr>
<th>Element of Framework</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Physiological, psychological and situational factors interact with their combined effect influencing postoperative pain and HRQOL</td>
</tr>
<tr>
<td>2</td>
<td>The symptoms of postoperative pain and HRQOL interact and influence each other and influence healthcare use</td>
</tr>
</tbody>
</table>

*HRQOL = Health-related quality of life
Appendix C. Chart Extraction Form

Patient Chart Information  CR# _________________

Date of Extraction: _________________________

Indication for surgery (i.e. diagnosis):
___________________________________________________________________________

Malignancy:  □ No  □ Yes  If yes, treatment modality:  □ Chemo  □ Radiation

Pre-op pain medication:  _______________________________________________________

Prior abdominal surgery:  □ No  □ Yes  If yes, specify: _____________________________

OR time:  _________________ minutes

Blood loss:  _________________ cc

Anesthetic technique:  □ General  □ Block  □ Spinal  □ Epidural

Incision type:  □ Pfannenstiel  □ Maylard  □ Lower vertical midline  □ Cherney  □ McBurney

Skin Suture Material:  □ Dissolving  □ Non-dissolving  □ Staples  □ Adhesive

Pain Scale (PACU):  Highest score recorded (0-10):  ______  Last score recorded (0-10):  ______
Pain Scale (Ward):  Highest score recorded (0-10):  ______  Last score recorded (0-10):  ______

Nausea (PACU):  Any incidence:  □ No  □ Yes  At discharge:  □ No  □ Yes

Nausea (Ward):  Any incidence:  □ No  □ Yes  At discharge:  □ No  □ Yes

Vomiting (PACU):  Any incidence:  □ No  □ Yes  At discharge:  □ No  □ Yes

Vomiting (Ward):  Any incidence:  □ No  □ Yes  At discharge:  □ No  □ Yes

Discharge Rx (for pain):  _______________________________________________________

Co morbidities:  □ Hypertension  □ Diabetes mellitus  □ Osteoarthritis  □ Chronic back pain
□ Depression / Anxiety disorder  □ Migraines  □ Other  ___________________________

Smoker:  □ No  □ Yes

Body weight:  ____________ kg

Body mass index (BMI):  ____________ kg/m²

Family doctor name:  ________________________________________________
<table>
<thead>
<tr>
<th>C-Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gravidity: ___________  Parity: ___________</td>
</tr>
<tr>
<td>Preeclampsia: ☐️ No ☐️ Yes</td>
</tr>
<tr>
<td>Indication for c-section:</td>
</tr>
<tr>
<td>C-section with tubal ligation: ☐️ No ☐️ Yes</td>
</tr>
<tr>
<td>Repeat c-section: ☐️ No ☐️ Yes  Previous incision utilized: ☐️ No ☐️ Yes</td>
</tr>
<tr>
<td>Still birth: ☐️ No ☐️ Yes  Twins / Multiples: ☐️ No ☐️ Yes  Weight of newborn(s): _____ g</td>
</tr>
</tbody>
</table>
Appendix D. Preoperative Demographics Questionnaire

Demographics Questionnaire

What is your current age? ________

What is your marital status?

☐ Single
☐ Married
☐ Widowed
☐ Divorced / Separated

What is your highest level of education?

☐ Grade 8 or less
☐ Grade 9-13 without diploma
☐ High school diploma
☐ Trade or professional school certificate / diploma
☐ Some university
☐ University degree
☐ Post-graduate degree(s)

What is your email address? _________________________________

Please indicate your racial heritage:

☐ Asian
A person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent, including, for example, Cambodia, China, India, Japan, Korea, Malaysia, Pakistan, the Philippine Islands, Thailand, and Vietnam.

☐ Black or African American
A person having origins in any of the black racial groups of Africa.

☐ First Nation or Native American
A person having origins in any of the original peoples of North, Central, or South America, and who maintains tribal affiliation or community attachment.
☐ Hispanic or Latino
A person of Mexican, Puerto Rican, Cuban, South or Central American, or other Spanish culture or origin, regardless of race.

☐ Pacific Islander
A person having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands.

☐ White or Caucasian
A person having origins in any of the original peoples of Europe, the Middle East, or North Africa.

☐ Mixed or Multiracial
A person having origins in two or more of the racial categories specified above.

At what age did you have your first period? ________

Have your periods stopped?

☐ Yes, naturally
☐ Yes, surgically
☐ No
☐ Not sure, cycle irregular

Are you currently taking hormone replacement therapy?

☐ Yes
☐ No

In the past month, did you take birth control pills?

☐ Yes
☐ No

How many days since the beginning of your last period? ________

Thank You
Appendix E. Preoperative Pain Measurement Questionnaire

**Brief Pain Inventory – long form**

Date: / /

Name: ____________________________ ___________________________ ____________________________  
Last                                        First                             Middle Initial

Phone: (_____)__________________                                                              Sex: ☐ Female  ☐ Male

Date of Birth: ______/_____/______

1) Marital Status (at present)
   1. ☐ Single                     3. ☐ Widowed

2) Education (Circle only the highest grade or degree completed)

Grade               0       1       2       3       4       5       6       7       8       9
   10     11     12      13     14    15     16     M.A./M.S.

   Professional degree (please specify) ____________________

3) Current Occupation__________________________________________________
   (specify titles; if you are not working, tell us your previous occupation)

4) Spouse’s occupation

________________________________________________

5) Which of the following best describes your current job status?

   1. ☐ Employed outside the home, full-time
   2. ☐ Employed outside the home, part-time
   3. ☐ Homemaker
   4. ☐ Retired
   5. ☐ Unemployed
   6. ☐ Other
6) How long has it been since you first learned your diagnosis? ______ months

7) Have you ever had pain due to your present disease?
   1. ☐ Yes    2. ☐ No    3. ☐ Uncertain

8) When you first received your diagnosis, was pain one of your symptoms?
   1. ☐ Yes    2. ☐ No    3. ☐ Uncertain

9) Have you had surgery in the past month?  1. ☐ Yes  2. ☐ No
   If YES, what kind? _____________________________

10) Throughout our lives, most of us have had pain from time to time (such as minor headaches, sprains, toothaches). Have you had pain OTHER than these everyday kinds of pain during the PAST WEEK?
   1. ☐ Yes    2. ☐ No

10a) Did you take pain medications in the last 7 days?
   1. ☐ Yes    2. ☐ No

10b) I feel I have some form of pain now that requires medication each and every day.
   1. ☐ Yes    2. ☐ No

IF YOUR ANSWERS TO 10, 10a, AND 10b WERE ALL NO, PLEASE STOP HERE AND GO TO THE LAST PAGE OF THE QUESTIONNAIRE AND SIGN WHERE INDICATED ON THE BOTTOM OF THE PAGE.
IF ANY OF YOUR ANSWERS TO 10, 10a, AND 10b WERE YES, PLEASE CONTINUE.
11) On the diagram, shade in the areas where you feel pain. Put an X on the area that hurts the most.

12) Please rate your pain by circling the one number that best describes your pain at its WORST in the last week.

0 1 2 3 4 5 6 7 8 9 10
No Pain Pain as bad as you can imagine

13) Please rate your pain by circling the one number that best describes your pain at its LEAST in the last week.

0 1 2 3 4 5 6 7 8 9 10
No Pain Pain as bad as you can imagine

14) Please rate your pain by circling the one number that best describes your pain on the AVERAGE.

0 1 2 3 4 5 6 7 8 9 10
No Pain Pain as bad as you can imagine
15) Please rate your pain by circling the one number that tells how much pain you have RIGHT NOW.

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No Pain</td>
<td>Pain as bad as you can imagine</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

16) What kinds of things make your pain feel better (for example, heat, medicine, rest)?
________________________________________________________________
________________________________________________________________

17) What kinds of things make your pain worse (for example, walking, standing, lifting)?
________________________________________________________________
________________________________________________________________

18) What treatments or medications are you receiving for pain?
________________________________________________________________
________________________________________________________________

19) In the last week, how much relief have pain treatments or medications provided? Please circle the one percentage that most shows how much relief you have received.

<table>
<thead>
<tr>
<th></th>
<th>0%</th>
<th>10%</th>
<th>20%</th>
<th>30%</th>
<th>40%</th>
<th>50%</th>
<th>60%</th>
<th>70%</th>
<th>80%</th>
<th>90%</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No relief</td>
<td>Complete Relief</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

20) If you take pain medication, how many hours does it take before the pain returns?

1. ☐ Pain medication doesn’t help at all
2. ☐ One hour
3. ☐ Two hours
4. ☐ Three hours
5. ☐ Four hours
6. ☐ Five to twelve hours
7. ☐ More than twelve hours
8. ☐ I do not take pain medication
21) Check the appropriate answer for each item.
   I believe my pain is due to:
   ☐ Yes  ☐ No  1. The effects of treatment (for example, medication, surgery, radiation, prosthetic device)
   ☐ Yes  ☐ No  2. My primary disease (meaning the disease currently being treated and evaluated)
   ☐ Yes .... ☐ No  3. A medical condition unrelated to my primary disease (for example, arthritis).
   Please describe condition: __________________________

22) For each of the following words, check Yes or No if that adjective applies to your pain.

   Aching ☐ Yes ☐ No
   Throbbing ☐ Yes ☐ No
   Shooting ☐ Yes ☐ No
   Stabbing ☐ Yes ☐ No
   Gnawing ☐ Yes ☐ No
   Sharp ☐ Yes ☐ No
   Tender ☐ Yes ☐ No
   Burning ☐ Yes ☐ No
   Exhausting ☐ Yes ☐ No
   Tiring ☐ Yes ☐ No
   Penetrating ☐ Yes ☐ No
   Nagging ☐ Yes ☐ No
   Numb ☐ Yes ☐ No
   Miserable ☐ Yes ☐ No
   Unbearable ☐ Yes ☐ No

23) Circle the one number that describes how, during the past week, PAIN has interfered with your:

   A. General Activity

   0  1  2  3  4  5  6  7  8  9  10
   Does not Interfere Completely Interferes

   B. Mood

   0  1  2  3  4  5  6  7  8  9  10
   Does not Interfere Completely Interferes
C. Walking Ability

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does not interfere</td>
<td>Completely interferes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

D. Normal Work (includes both work outside the home and housework)

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does not interfere</td>
<td>Completely interferes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

E. Relations with other people

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does not interfere</td>
<td>Completely interferes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

F. Sleep

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does not interfere</td>
<td>Completely interferes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

G. Enjoyment of life

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does not interfere</td>
<td>Completely interferes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

24) I prefer to take my pain medicine:
   1. On a regular basis
   2. Only when necessary
   3. Do not take pain medicine

25) I take my pain medicine (in a 24 hour period):
   1. Not every day
   2. 1 to 2 times per day
   3. 3 to 4 times per day
   4. 5 to 6 times per day
   5. More than 6 times per day

26) Do you feel you need a stronger type of pain medication?
   1. Yes
   2. No
   3. Uncertain
27) Do you feel you need to take more of the pain medication than your doctor has prescribed?
   1. ☐ Yes  2. ☐ No  3. ☐ Uncertain

28) Are you concerned that you use too much pain medication?
   1. ☐ Yes  2. ☐ No  3. ☐ Uncertain
   If Yes, why? ______________________________________________________________________
   ______________________________________________________________________

29) Are you having problems with side effects from your pain medication?
   1. ☐ Yes  2. ☐ No
   Which side effects? ______________________________________________________________________

30) Do you feel you need to receive further information about your pain medication?
   1. ☐ Yes  2. ☐ No

31) Other methods I use to relieve my pain include: (Please check all that apply)
   ☐ Warm compresses  ☐ Cold compresses  ☐ Relaxation techniques
   ☐ Distraction  ☐ Biofeedback  ☐ Hypnosis
   ☐ Other  Please Specify ______________________________________________________________________

32) Medications not prescribed by my doctor that I take for pain are:
   ______________________________________________________________________
   ______________________________________________________________________
Appendix F. Postoperative Pain Measurement Questionnaire

Brief Pain Inventory – short form

Date:    /    /

Name: __________________________________________ ____________________________ ________________
Last                                       First                             Middle Initial

1. Throughout our lives, most of us have had pain from time to time (such as minor headaches, sprains, toothaches). Have you had pain other than these everyday kinds of pain today?
   1. ☐ Yes                        2. ☐ No

2. On the diagram, shade in the areas where you feel pain. Put an X on the area that hurts the most.

![Diagram of body with shaded areas indicating pain](image)

3. Please rate your pain by circling the one number that best describes your pain at its WORST in the last 24 hours.

   0         1         2         3         4         5         6         7         8         9         10
   No Pain                           Pain as bad as you can imagine

4. Please rate your pain by circling the one number that best describes your pain at its LEAST in the last 24 hours.

   0         1         2         3         4         5         6         7         8         9         10
   No Pain                           Pain as bad as you can imagine
5. Please rate your pain by circling the one number that best describes your pain on the AVERAGE.

0         1         2         3         4         5         6         7         8         9         10
No Pain                           Pain as bad as you can imagine

6. Please rate your pain by circling the one number that tells how much pain you have RIGHT NOW.

0         1         2         3         4         5         6         7         8         9         10
No Pain                           Pain as bad as you can imagine

7. What treatments or medications are you receiving for your pain?
__________________________________________________________________
__________________________________________________________________

8. In the 24 hours, how much relief have pain treatments or medications provided? Please circle the one percentage that most shows how much relief you have received.

0%     10%     20%     30%     40%     50%     60%     70%     80%     90%     100%
No relief           Complete Relief

9. Circle the one number that describes how, during the past 24 hours, PAIN has interfered with your:

A. General Activity

0          1          2          3          4          5          6          7          8          9          10
Does not Interfere Completely Interferes

B. Mood

0          1          2          3          4          5          6          7          8          9          10
Does not Interfere Completely Interferes

C. Walking Ability

0          1          2          3          4          5          6          7          8          9          10
Does not Interfere Completely Interferes
### D. Normal Work (includes both work outside the home and housework)

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does not Interfere</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Completely Interferes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### E. Relations with other people

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does not Interfere</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Completely Interferes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### F. Sleep

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does not Interfere</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Completely Interferes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### G. Enjoyment of life

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does not Interfere</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Completely Interferes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix G. Pre- and Post-Operative Health-Related Quality of Life Questionnaire, Health Survey Short Form 36

Your Health in General

Please answer every question. Some questions may look like others, but each one is different. Please take the time to read and answer each question carefully, and mark an ☐ in the one box that best describes your answer. Thank you for completing this survey!

1. In general, would you say your health is:

<table>
<thead>
<tr>
<th>Excellent</th>
<th>Very good</th>
<th>Good</th>
<th>Fair</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

2. Compared to one year ago, how would you rate your health in general now?

<table>
<thead>
<tr>
<th>Much better now than one year ago</th>
<th>Somewhat better now than one year ago</th>
<th>About the same as one year ago</th>
<th>Somewhat worse now than one year ago</th>
<th>Much worse now than one year ago</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

☐ ☐ ☐ ☐ ☐
3. The following questions are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?

<table>
<thead>
<tr>
<th>Activity</th>
<th>Yes, limited a lot ▼</th>
<th>Yes, limited a little ▼</th>
<th>No, not limited at all ▼</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Vigorous activities, such as running, lifting heavy objects, participating in strenuous sports</td>
<td>□ □</td>
<td>□ □</td>
<td>□ □</td>
</tr>
<tr>
<td>b. Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling or playing golf</td>
<td>□ □ □ □ □ □ □ □ □ □ □</td>
<td>□ □ □ □ □ □ □ □ □ □ □</td>
<td>□ □ □ □ □ □ □ □ □ □ □</td>
</tr>
<tr>
<td>c. Lifting or carrying groceries</td>
<td>□ □ □ □ □ □ □ □ □ □ □</td>
<td>□ □ □ □ □ □ □ □ □ □ □</td>
<td>□ □ □ □ □ □ □ □ □ □ □</td>
</tr>
<tr>
<td>d. Climbing several flights of stairs</td>
<td>□ □ □ □ □ □ □ □ □ □ □</td>
<td>□ □ □ □ □ □ □ □ □ □ □</td>
<td>□ □ □ □ □ □ □ □ □ □ □</td>
</tr>
<tr>
<td>e. Climbing one flight of stairs</td>
<td>□ □ □ □ □ □ □ □ □ □ □</td>
<td>□ □ □ □ □ □ □ □ □ □ □</td>
<td>□ □ □ □ □ □ □ □ □ □ □</td>
</tr>
<tr>
<td>f. Bending, kneeling or stooping</td>
<td>□ □ □ □ □ □ □ □ □ □ □</td>
<td>□ □ □ □ □ □ □ □ □ □ □</td>
<td>□ □ □ □ □ □ □ □ □ □ □</td>
</tr>
<tr>
<td>g. Walking more than a kilometer</td>
<td>□ □ □ □ □ □ □ □ □ □ □</td>
<td>□ □ □ □ □ □ □ □ □ □ □</td>
<td>□ □ □ □ □ □ □ □ □ □ □</td>
</tr>
<tr>
<td>h. Walking several hundred meters</td>
<td>□ □ □ □ □ □ □ □ □ □ □</td>
<td>□ □ □ □ □ □ □ □ □ □ □</td>
<td>□ □ □ □ □ □ □ □ □ □ □</td>
</tr>
<tr>
<td>i. Walking one hundred meters</td>
<td>□ □ □ □ □ □ □ □ □ □ □</td>
<td>□ □ □ □ □ □ □ □ □ □ □</td>
<td>□ □ □ □ □ □ □ □ □ □ □</td>
</tr>
<tr>
<td>j. Bathing or dressing yourself</td>
<td>□ □ □ □ □ □ □ □ □ □ □</td>
<td>□ □ □ □ □ □ □ □ □ □ □</td>
<td>□ □ □ □ □ □ □ □ □ □ □</td>
</tr>
</tbody>
</table>
4. During the past 4 weeks, how much of the time have you had any of the following problems with your work or other regular daily activities as a result of your physical health?

<table>
<thead>
<tr>
<th></th>
<th>All of the time</th>
<th>Most of the time</th>
<th>Some of the time</th>
<th>A little of the time</th>
<th>None of the time</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Cut down on the amount of time you spent on work or other activities</td>
<td>▼</td>
<td>▼</td>
<td>▼</td>
<td>▼</td>
<td>▼</td>
</tr>
<tr>
<td>b. Accomplished less than you would like</td>
<td>□ □ □ □ □ □</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Were limited in the kind of work or other activities</td>
<td>□ □ □ □ □ □</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. Had difficulty performing the work or other activities (for example, it took extra effort)</td>
<td>□ □ □ □ □ □</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. During the past 4 weeks, how much of the time have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?

<table>
<thead>
<tr>
<th></th>
<th>All of the time</th>
<th>Most of the time</th>
<th>Some of the time</th>
<th>A little of the time</th>
<th>None of the time</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Cut down on the amount of time you spent on work or other activities</td>
<td>▼</td>
<td>▼</td>
<td>▼</td>
<td>▼</td>
<td>▼</td>
</tr>
<tr>
<td>b. Accomplished less than you would like</td>
<td>□ □ □ □ □ □</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Did work or other activities less carefully than usual</td>
<td>□ □ □ □ □ □</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
6. During the past 4 weeks, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbours or groups?

Not at all  Slightly  Moderately  Quite a bit  Extremely
\[ ▼ \]  \[ ▼ \]  \[ ▼ \]  \[ ▼ \]  \[ ▼ \]
\[ □ \]  \[ □ \]  \[ □ \]  \[ □ \]  \[ □ \]  \[ □ \]

7. How much bodily pain have you had during the past 4 weeks?

None  Very mild  Mild  Moderate  Severe  Very Severe
\[ ▼ \]  \[ ▼ \]  \[ ▼ \]  \[ ▼ \]  \[ ▼ \]  \[ ▼ \]
\[ □ \]  \[ □ \]  \[ □ \]  \[ □ \]  \[ □ \]  \[ □ \]

8. During the past 4 weeks, how much did pain interfere with your normal work (including both work outside and inside the home and housework)?

Not at all  A little bit  Moderately  Quite a bit  Extremely
\[ ▼ \]  \[ ▼ \]  \[ ▼ \]  \[ ▼ \]  \[ ▼ \]
\[ □ \]  \[ □ \]  \[ □ \]  \[ □ \]  \[ □ \]  \[ □ \]  \[ □ \]
9. These questions are about how you feel and how things have been with you during the past 4 weeks. For each question, please give the one answer that comes closest to the way you have been feeling. How much of the time during the past 4 weeks…

<table>
<thead>
<tr>
<th>All of the time</th>
<th>Most of the time</th>
<th>Some of the time</th>
<th>A little of the time</th>
<th>None of the time</th>
</tr>
</thead>
</table>

a. Did you feel full of life? [ ] [ ] [ ] [ ] [ ]

b. Have you been very nervous? [ ] [ ] [ ] [ ] [ ]

c. Have you felt so down in the dumps that nothing could cheer you up? [ ] [ ] [ ] [ ] [ ]

d. Have you felt calm and peaceful? [ ] [ ] [ ] [ ] [ ]

e. Did you have a lot of energy? [ ] [ ] [ ] [ ] [ ]

f. Have you felt downhearted and depressed? [ ] [ ] [ ] [ ] [ ]

g. Did you feel worn out? [ ] [ ] [ ] [ ] [ ]

h. Have you been happy? [ ] [ ] [ ] [ ] [ ]

i. Did you feel tired? [ ] [ ] [ ] [ ] [ ]
10. During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting with friends, relatives, etc.)?

<table>
<thead>
<tr>
<th>All of the time</th>
<th>Most of the time</th>
<th>Some of the time</th>
<th>A little of the time</th>
<th>None of the time</th>
</tr>
</thead>
<tbody>
<tr>
<td>▼</td>
<td>▼</td>
<td>▼</td>
<td>▼</td>
<td>▼</td>
</tr>
</tbody>
</table>

11. How TRUE or FALSE is each of the following statements for you?

<table>
<thead>
<tr>
<th>Definitely true</th>
<th>Mostly true</th>
<th>Don’t know</th>
<th>Mostly false</th>
<th>Definitely false</th>
</tr>
</thead>
<tbody>
<tr>
<td>▼</td>
<td>▼</td>
<td>▼</td>
<td>▼</td>
<td>▼</td>
</tr>
</tbody>
</table>

   a. I seem to get sick a little easier than other people .................. ☐ ☐ ☐ ☐ ☐

   b. I am as healthy as anyone I know…… ☐ ☐ ☐ ☐ ☐

   c. I expect my health to get worse ........ ☐ ☐ ☐ ☐ ☐

   d. My health is excellent ................... ☐ ☐ ☐ ☐ ☐
Appendix H. Preoperative Healthcare Use Questionnaire

**Pre-Surgical Health Utilization Form**

1. In the past 12 months, how many times have you seen your doctor, ___Doctor a specialist, visited the emergency department or visited a walk-in ___Specialist clinic because of pain? ___Walk-in ___ED

2. In the past 12 months, how many days of work, school or other ___days regular activities did you miss because of pain?

3. In the past 12 months, how many days did your pain interfere with ___days physical or daily activities including socializing?

4. In the past 12 months, how many times have you seen other health ___times care professionals (e.g. chiropractors, physiotherapists) because of pain?

5. In the past 12 months, how happy have you been with your ability to control your pain by means of medication or other therapy?
   - □ Not applicable, since I have no significant pain
   - □ Completely dissatisfied
   - □ Somewhat or fairly satisfied
   - □ Completely satisfied

6. Please rate where you think your pain level will be one week following surgery by circling one number on the scale of 0 to 10.
   
   0 1 2 3 4 5 6 7 8 9 10
   
   No Pain
   
   Pain as bad as you can imagine
7. Please rate where you think your pain level will be around six weeks after surgery by circling one number on the scale of 0 to 10.

0 1 2 3 4 5 6 7 8 9 10
No Pain
Pain as bad as you can imagine

8. What medications are you currently using to control pain?__________

__________________________________________
Appendix I: Postoperative Healthcare Use Questionnaire

Six-Week Post-Surgical Health Care Utilization

1. Did you receive a prescription for pain medication after surgery? □ No □ Yes
   • If yes, what medication was prescribed? ______________________
   • Did you get the prescription filled? □ No □ Yes
   • If you did not fill the prescription, why not? ______________________
   • Did you take the prescribed pain medication? □ No □ Yes
   • If you did not take the prescribed medication, why not?______________
   • Are you still taking the pain medication? □ No □ Yes

2. Did you take any other medication for pain? □ No □ Yes
   (e.g. Tylenol, Aspirin or Advil)
   • If yes, which one(s)?                                      ______________________
   • If yes, are you still taking them? □ No □ Yes

3. Please rate your pain by circling the one number that tells how much pain you have right now.
   0 1 2 3 4 5 6 7 8 9 10
   No Pain
   Pain as bad as you can imagine

4. In the past 6 weeks, how many times have you seen your doctor, a specialist, visited the emergency department or visited a walk-in clinic because of pain?
   ___ Doctor
   ___ Specialist
   ___ Walk-in
   ___ ED

5. Do you believe that this pain is related to your surgery from 6 weeks ago?
   □ No □ Yes □ Not sure □ N/A (no pain)
6. Have you been hospitalized in the past 6 weeks?
   □ No          □ Yes

   If yes, How many times? ________________________
   For what reason(s)? _____________________________

7. In the past 6 weeks, how many times have you seen other health care professionals (e.g. chiropractors, physiotherapists) because of pain? ___ times

8. In the past 6 weeks, how many times have you phoned someone (doctor, nurse, Pharmacist) to ask about pain medication? ___ times

9. In the past 6 weeks, how many days of work, school or other regular activities did you miss because of pain? ___ days

10. In the past 6 weeks, how many days did your pain interfere with physical daily activities including socializing? ___ days

11. In the past 6 weeks, how happy have you been with your ability to control your pain by means of medication or other therapy?
   □ Not applicable, since I have no significant pain
   □ Completely dissatisfied
   □ Somewhat or fairly satisfied
   □ Completely satisfied

12. In the past 6 weeks, have you been diagnosed with an infection related to your surgery? 
   □ No          □ Yes

13. Have you had any events in the past 6 weeks, such as a fall or another surgery, that affected how you answered these questions? 
   □ No          □ Yes

   If yes, would you mind telling us what other event(s)? ________________________________
Appendix J: Preoperative Depression Questionnaire

**Center for Epidemiological Studies**

Please circle the number which best describes how often you felt or behaved this way – DURING THE PAST WEEK

<table>
<thead>
<tr>
<th>Category</th>
<th>Rarely or none of the time (less than 1 day)</th>
<th>Some or a little of the time (1-2 days)</th>
<th>Occasionally or a moderate amount of the time (3-4 days)</th>
<th>Most or all of the time (5-7 days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I was bothered by things that usually don’t bother me.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>2. I did not feel like eating; my appetite was poor.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>3. I felt that I could not shake off the blues even with help from my family and friends.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4. I felt that I was just as good as other people.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>5. I had trouble keeping my mind on what I was doing.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>6. I felt depressed.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>7. I felt that everything I did was an effort.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>8. I felt hopeful about the future.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>9. I thought my life had been a failure.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>10. I felt fearful.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>11. My sleep was restless.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Rarely or none of the time (less than 1 day)</td>
<td>Some or a little of the time (1-2 days)</td>
<td>Occasionally or a moderate amount of the time (3-4 days)</td>
<td>Most or all of the time (5-7 days)</td>
</tr>
<tr>
<td>---------------------</td>
<td>---------------------------------------------</td>
<td>----------------------------------------</td>
<td>--------------------------------------------------------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td>12. I was happy.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>13. I talked less than usual.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>14. I felt lonely.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>15. People were unfriendly.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>16. I enjoyed life.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>17. I had crying spells.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>18. I felt sad.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>19. I felt that people disliked me.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>20. I could not get “going”.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>
Appendix K: Preoperative Anxiety Questionnaire

State Trait Anxiety Form

Self-Evaluation Form S

ID # ________

Directions: A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate number to the right of the statements to indicate how you feel right now, that is, at this moment. There are no wrong or right answers. Do not spend much time on any one statement but give the answer which seems to describe your present feelings best.

<table>
<thead>
<tr>
<th></th>
<th>Not at all</th>
<th>Somewhat so</th>
<th>Moderately so</th>
<th>Very much so</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>I feel calm</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>b)</td>
<td>I feel secure</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>c)</td>
<td>I am tense</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>d)</td>
<td>I feel strained</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>e)</td>
<td>I am at ease</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>f)</td>
<td>I feel upset</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>g)</td>
<td>I am presently worrying over possible misfortunes</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>h)</td>
<td>I feel satisfied</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>i)</td>
<td>I feel frightened</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>j)</td>
<td>I feel comfortable</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>k)</td>
<td>I feel self-confident</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>l)</td>
<td>I feel nervous</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Sentence</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>------------------------------</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>m) I feel jittery</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>n) I feel indecisive</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>o) I am relaxed</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>p) I feel confident</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>q) I am worried</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>r) I feel confused</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>s) I feel steady</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>t) I feel pleasant</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
# Self-Evaluation Form T

**ID # _______**

**Directions:** A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate number to the right of the statements to indicate how you *generally* feel.

<table>
<thead>
<tr>
<th>Statement</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) I feel pleasant.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) I feel nervous and restless.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) I feel satisfied with myself.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d) I wish I could be as happy as others seem to</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>be</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e) I feel like a failure.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f) I worry too much over something that really doesn’t matter.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>g) I am cool, calm and collected.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>h) I feel that difficulties are piling up so that I cannot overcome them.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>i) I feel rested.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>j) I am happy.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>k) I have disturbing thoughts.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>l) I lack self-confidence.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>m) I feel secure.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n) I make decisions easily.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>o) I feel inadequate.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Statement</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>----</td>
<td>---------------------------------------------------------------------------</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>p)</td>
<td>I am content</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>q)</td>
<td>Some unimportant thought runs through my mind and bothers me</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>r)</td>
<td>I take disappointments so keenly that I can’t put them out of my mind</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>s)</td>
<td>I am a steady person</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>t)</td>
<td>I get in a state of turmoil as I think over my recent concerns and interests</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
Appendix L: Preoperative Somatization Questionnaire

Seven Symptom Screening Test

For the following seven questions, please check the box for ‘No’ or ‘Yes’ as appropriate.

1. Have you ever had trouble breathing?  
   □ Yes  □ No

2. Have you ever had frequent trouble with menstrual cramps?  
   □ Yes  □ No

3. Have you ever had burning sensations in your sexual organs, mouth, or rectum?  
   □ Yes  □ No

4. Have you ever had difficulties swallowing or had an uncomfortable lump in your throat that stayed with you for at least an hour?  
   □ Yes  □ No

5. Have you ever found that you could not remember what you had been doing for hours or days at a time?  
   □ Yes  □ No

   *If yes,* did this happen even though you had not been drinking or taking drugs?  
   □ Yes  □ No

6. Have you ever had trouble from frequent vomiting?  
   □ Yes  □ No

7. Have you ever had frequent pain in your fingers or toes?  
   □ Yes  □ No