Oligoanalgesia in Adult Colles Fracture Patients Admitted to the Emergency Department

by

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Abstract

Pain is the most common reason that patients frequent the Emergency Department. Pain is a complex symptom to assess properly and according to research, it appears to be poorly managed in the Emergency Department. The majority of research has focused on the incidence of oligoanalgesia in large samples of patients with heterogeneous injuries. Pain management will differ depending on the type of injury a patient has sustained. The occurrence of oligoanalgesia in a homogeneous injury, such as Colles fracture, has yet to be explored.

This is a pilot study using a retrospective chart review to determine the incidence of oligoanalgesia in adult Colles fracture patients admitted to two urban Emergency Departments in Western Canada. One hundred and fifty charts from site 1 and site 2 were analyzed from the last five years to determine the occurrence of oligoanalgesia. There was no statistical difference in age groups, who received analgesia, and females were more likely to receive analgesia, but this was not significant. Age and sex were not significantly associated with receipt of an opioid. Age and sex were significant predictors of pain assessment. Neither age nor sex were significant predictors of pain reassessment. Pain reassessment was only completed in 47% of patients who received an initial pain assessment, This was significant when compared to the best practice standard.

Dedication

This work is dedicated to the patients who suffer in pain and for those who may endure unrelieved pain in the future. Also to the Emergency Department staff who work in a chaotic and unpredictable environment. This thesis is dedicated to you. May we together strive to end oligoanalgesia in the Emergency Department.

Preface

This thesis is an original work by Ashley Pasiorowski. This research project, "Oligoanalgesia in Adult Colles Fracture Patients Admitted to the Emergency Department" received research ethics approval from the University of Alberta Research Ethics Board on August 5, 2014, Pro00048997.

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Table of Contents

List of Tables

Chapter 1: Introduction

Problem Statement

The term "oligoanalgesia" is used to describe a phenomenon of failure to acknowledge pain, failure to assess initial pain, failure to have pain management guidelines in the Emergency Department (ED), failure to document pain and to assess treatment adequacy, and failure to meet the patient's expectations in terms of their pain management (Motov & Khan, 2009). Pain is the most common reason to visit an ED and is often undertreated. The incidence of oligoanalgesia in the ED has commonly been an issue for patients 65 years and older (Iyer, 2011). It is estimated that older adults with acute pain are up to 20% less likely to receive analgesia than younger patients (Hwang & Platts-Mills, 2013). With the Canadian population aging, it is likely that they will represent a larger proportion of ED users and the incidence of oligoanalgesia will continue to be a problem unless it is addressed now.

A three-fold problem will serve as a point of departure for this investigation. Two research teams found that older individuals who visited the ED for pain-related problems were less likely to receive analgesia younger individuals (Denny & Guido, 2012; Platts-Mills, Esserman, Brown, Bortsov, Sloane, & McLean, 2012). For example, older adult patients are a third less likely to receive an opioid for pain after a clavicle fracture has occurred (Dohrenwend, Fiesseler, Cochrane, & Allegra, 2007). Inadequate pain control in the older patient population can have significant repercussions in overall health status. Older adults who are under treated for pain are at risk for decreased quality of life, impaired function, poor sleep, decreased balance, increased incidence of falls, and mortality (Platts-Mills et al., 2012).

The second problem is related to the reasons behind oligoanalgeisia in older adults. The underuse of opioids in the elderly patient population is often due to incorrect assumptions that

adverse side effects will appear and patients may become opioid dependent (Gueant, Taleb, Borel-Kuhner, Cauterman, Raphael, Nathan & Rocard-Hibon, 2011). The occurrence of accurate pain assessments in the ED is low, and it is compounded by factors such as physician skepticism about patients' reports of pain, and objectification of the pain experience (Motov & Khan, 2009). Opioids may need to be administered to elderly patients in low dose boluses when multiple co-morbidities are present, but elderly patients are able to tolerate opioids and require them when they have moderate to severe pain (Jones, Johnson, & McNinch, 1996).

The third problem is the tendency to not assess or reassess pain in older adults in the ED compared to younger patients. The first step of effective pain management is a formal pain assessment (Evans, 2004). In order to effectively treat pain in the ED, all patients need an initial pain assessment and routine pain reassessments to follow-up on pain intensity and treatment efficacy (Herr & Titler, 2009). Pain documentation is suboptimal in the elderly population, with only 75% of visits having a pain assessment completed (Iyer, 2011). Inaccurate or incomplete pain assessments are a primary predictor of oligoanalgesia occurring in the ED (Allione, Melchio, Martini, Dutto, Ricca, Bernardi, Pomero, Menardo, & Tartaglino, 2011; Platts-Mills et al., 2012). In the ED, assessment of pain should occur every 4 hours and as required to assess effectiveness of pain treatments (Denny et al., 2012). Pain is a subjective symptom and does not always accompany physiological signs, therefore triage nurses and ED staff may experience difficulty in interpreting the acuity of a patient's pain, which could lead to oligoanalgesia (Fry, Holdgate, Baird, Silk, & Ahern, 1999). A major factor in the apparent lack of pain assessments in the ED is the tendency for older patients to under-report pain (Evans, 2004). Older adults also may have pain but present to the ED with stoicism, depression, memory deficits, and cognitive deficits that may make pain assessment difficult for ED staff (Jones et al., 1996). Effective

communication is a key factor that enables a patient to report pain to the nurse, and ineffective or rushed communication may prevent appropriate pain assessment and management (Evans, 2004).

Adequate pain management in older patients that present to the ED has a significant impact on the incidence of hospitalization, susceptibility to infections, ambulation, cognition, and social relationships (Hwang et al., 2013; Denny et al., 2012). The elderly population is estimated to be growing and makes up a significant percentage of ED patients. As the population continues to age, providing effective pain management will be critical and will reduce the burden on the healthcare system (Evans, 2004). The phenomenon of oligoanalgesia in the ED needs to be further addressed to ensure patients are receiving quality and effective pain management and treatment.

There is a substantial amount of peer-reviewed literature that supports the claim that oligoanalgesia is occurring in the ED, especially among the older patients. However, very few have compared age and sex in a sample of patients with a homogenous injury that can be sustained easily in all age groups. For this reason, the injury of choice in this study is Colles fracture. A retrospective cohort study was conducted and five different age groups, sex, and site (Site 1 ED and site 2 ED) were compared for pain assessment/reassessment, analgesia receipt and opioid receipt.

Purpose

The primary purpose of this study was to explore whether inequities exist in pain management of adults with a Colles fracture admitted to the ED. A second purpose of this study was to identify if oligoanalgesia was occurring in the ED.

My Interest in this Topic

I worked as a registered nurse in the ED for over one year, I have met many patients who presented with pain and whose pain was under assessed and under managed. I believe that it is a patient's right to have their pain treated appropriately and effectively. It is my experience that older patient's are at risk for oligoanalgesia in the ED due primarily to difficulty assessing pain severity and a lack of willingness by health professionals to prescribe opioids for fear of adverse effects. I am a strong advocate in effective pain management for all patients who present to the ED with pain. I question whether the ED staff receives adequate education on acute pain management. I am interested in what we can do as a profession to improve the quality of pain management that patients receive in the ED. However, the first step in this process is to identify if oligoanalgesia is an issue.

Objectives and Research Questions

The objectives of this pilot study were to determine if there were inequities in pain management and pain assessment in a cohort of adult patients with a diagnosis of Colles fracture who are admitted to an ED.

The research questions for this study are:

1. Does receipt of analgesia in adult Colles fracture patients admitted to the ED vary across age groups, sex, and site (Site 1 ED and site 2 ED)?
2. Of those received analgesia, do age, sex, and site predict receipt of an opioid?
3. Do age, sex, and site, predict pain assessment and reassessment?

Definitions

Colles Fracture: A fracture of the lower end of the radius with backward displacement of the lower fragment and radial deviation of the hand at the wrist that produces a characteristic "dinner fork" deformity. Colles fracture may also be defined as a distal radius fracture.

Older Adult: for the proposed study, older adult is defined as any patient who is 65 years of age and older.

Sex: Male or female.

Pain Assessment and Pain Reassessment: the process of determining how much pain a patient is in by using an objective numeric rating scale or verbal rating scale. Pain reassessment is the same process as above except it is performed after the administration of a pain relieving treatment. Examples of pain assessment scales include:

NRS: 0 1 2 3 4 5 6 7 8 9 10 [0, no pain; 10, worst pain ever experienced]

VDS[29]: no pain, mild pain, moderate pain, severe pain, extreme pain, most intense pain imaginable

Analgesic: Drug that relieves pain without blocking nerve impulse conduction or markedly altering sensory function.

Opioid: Opioid analgesics include not only the natural and semisynthetic alkaloid derivatives from opium but also synthetic surrogates, other opioid-like drugs whose actions are blocked by the nonselective antagonist naloxone, plus several endogenous peptides that interact with the different subtypes of opioid receptors (Schumacher, Basbaum, & Way, 2012).

Organization of the Proposal

Chapter two provides a literature review pertaining to the evidence of oligoanalgesia occurring in the Emergency Department. Chapter three describes the methods to be used in this study. Chapter four discusses the data related to all research questions. Chapter five is the

discussion of the findings. Chapter six provides education, research and clinical implications as well as a concluding statement.

Chapter 2: Literature Review

Search Strategy

A comprehensive search of the literature regarding oligoanalgesia in the Emergency Department (ED) was conducted using the electronic databases CINAHL, Medline-Ovid EBSCO, and Pubmed. Search terms for CINAHL, Medline and Pubmed included oligoanalgesia in the Emergency Department, oligoanalgesia and elderly patients, acute pain management in the Emergency Department, acute pain assessments in the Emergency Department. The MeSH terms used included pain documentation, emergency department, emergency, quality, aged, acute pain, pain, pain management, older adults, elderly, risk factors, fracture analgesia and opioid. Search terms for CINAHL included headings pain management in the emergency department, pain management and elderly patients, oligoanalgesia in adult emergency department patients and pain assessment in elderly patients. Search terms for Medline included quality pain management in the Emergency Department, emergency department and fractures, pain management in the aged patient, and Risk factors for oligoanalgesia in the Emergency Department. Search terms for Pubmed included acute pain in older adults in the Emergency Department and Pain assessment in the Emergency Department. Articles gathered range from 1996 to 2013, as older pain management practices may not be applicable to current pain management in the ED. The initial search retrieved 383 articles.

Titles were read and abstracts reviewed in order to find applicable articles to use for reference. Studies were included if they discussed the phenomenon of oligoanalgesia in the ED, disparities in pain assessment in the ED, inequities in pain management practices in the ED, and elderly patients at risk for oligoanalgesia in the ED. Only articles that were published in a peer reviewed journal were included. Studies were excluded if the sample sizes were small (<50

participants) or if they excluded older adults. After excluding duplicates, 22 articles were selected for reference. The authors of the selected articles used a variety of designs including review articles, systematic reviews, cross sectional studies, retrospective cohort studies, national survey data, and observational prospective studies. Common themes included age discrimination, difficulty assessing pain, lack of acute pain education, adverse effects of pain, adverse effects of opioid use in the elderly population, and lack of pain assessment/reassessment.

Age Discrimination

Age was a common factor that led to increased odds that a patient with acute pain would experience oligoanalgesia in the ED. The main factor associated with oligoanalgesia in the ED was older age (Allione et al., 2011; Motov & Khan, 2009; Evans, 2004). Older adults at the extremes of age were less likely to receive an opiate prescription for a fracture when compared to younger patients with the same fracture (Dohrenwend et al., 2007). Older adults were also at an increased risk for under management of pain and treatment with inappropriate analgesics in the ED (Hwang, Richardson, Sonuyi, & Morrison, 2006; Hwang, Richardson, Harris, & Morrison, 2010). Younger patients were more likely to receive opioids and discharge analgesics in the ED compared to older patients (Heins, Heins, Grammas, Costello, Huang, & Mishra, 2006). The same findings were supported by several other research groups (Brown, Klein, Lewis, Johnston, & Cummings, 2003; Hwang et al., 2010; Motov et al., 2009). Two research teams found that age influences a nurse's interpretation of the pain assessment and administration of analgesia, often resulting in inadequate analgesia in the elderly (Denny et al., 2012; Fry, et. al., 1999). Nurse's need to make sure that an appropriate pain assessment is done on every patient who presents to the ED with the complaint of pain or a painful reason, such as fracture. Age discrimination may be occurring in the ED due to the stereotype that pain is a natural part of aging. A common

belief is that pain is an inevitable process of aging, and therefore pain in the elderly may too often be ignored or inadequately treated (Jones et al., 1996). Advanced age, sensory impairment, and co-morbidity can increase the vulnerability of older adults to pain under treatment (Denny et. al., 2012).

Difficulty Assessing Pain

One research group suggested that ED staff may have more difficulty assessing the pain of an elderly patient compared to a younger patient because elderly patients often present with atypical signs and symptoms and multiple comorbidities that can complicate pain assessment and pain management (Samaras, Chevalley, Samaras, & Gold, 2010). ED staff may therefore under-estimate patients' self-reports of pain; the discrepancy between the patient's self-report of pain and the staff member's assessment of pain is a powerful predictor of oligoanalgesia (Duignan & Dunn, 2008; Motov & Khan, 2009; Calil, Andraciolo de Mattos Pimenta, & Birolini, 2007). Even when a patient is obviously in acute pain in the ED, the assessment of the pain by the physician influences how the pain is managed (Rupp & Delaney, 2004). Effective communication is cited as an important factor in pain assessment and management, as ineffective communication can make it more difficult for ED staff to assess pain (Evans, 2004).

Lack of Acute Pain Education

Lack of education regarding assessment and management of acute pain in the ED was cited as a problem in multiple peer-reviewed articles. Deficits in the knowledge of ED nurses about pain management were cited as a primary concern that contributes to oligoanalgesia in the ED (Duignan & Dunn, 2008). Elderly patients were at risk for under management of pain because ED physicians may have not been appropriately educated in specific geriatric approaches to the assessment and management of pain, and many may be uncomfortable treating

pain in older patients (Samaras et al., 2010). Education for ED providers regarding acute pain management may improve pain assessment and documentation of pain and improve pain treatment in vulnerable populations (Brown et al., 2003; Cordell, Keene, Giles, Jones, Jones, & Brizendine, 2002; Denny et al., 2012; Rupp & Delaney, 2004). The lack of education regarding pain assessment and management may play a role in the inconsistent and inadequate management of pain (Platts-Mills et al., 2012). Almost 50% of ED physicians reported minimal education regarding the principles for providing analgesia to older patients (Jones et al., 2006; Rupp & Delaney, 2004). Length of experience managing pain also plays a role in ED pain management (Heins et al., 2006).

Adverse Effects of Inadequate Pain Management

A central theme in the literature was the adverse impact that untreated pain has on the elderly patient. Elderly patients who do not have their pain adequately managed in the ED may experience serious adverse outcomes such as a higher mortality rate, poor physical function, increased falls, and a higher hospitalization rate for ambulatory care conditions (Heins et al., 2006; Platts-Mills et al., 2012). In addition, pain is an aggravating factor for depression, social isolation, sleep disturbances, decreased ambulation, and increased health care utilization in older patients (Iyer, 2011).

Adverse Effects of Opioid Use in the Elderly Population

Fear of prescribing opioids to elderly patients due to the increased risk of drug related adverse events was another theme noted in the literature (Platts-Mills et al., 2012; Gueant et al., 2011; Samaras et al., 2010; Heins et al., 2006; Brown et al., 2003; Fry et al., 1999). There was an increased potential for drug-drug interactions and adverse events in the elderly population due to multiple comorbidities that can result in polypharmacy (Rupp & Delaney, 2004). Elderly

patients also experience age related changes in drug pharmacokinetics and pharmacodynamics that can change the way drugs are absorbed, distributed, metabolized, and eliminated, which may increase the chances of having an adverse event (Rupp & Delaney, 2004; Hwang et al., 2010). Elderly patients are still able to receive opioids safely if careful titration is used and frequent reassessments are performed to ensure safe acute pain care (Hwang & Platts-Mills, 2013; Herr & Titler, 2009). The tendency to under prescribe opioids to elderly patients based on the risk of an adverse events is compounded by the fears that elderly patients may have about taking the opioid, such as constipation, sedation, fear of addiction, and tolerance (Denny & Guido, 2012; Duignan & Dunn, 2008).

Pain Assessment and Reassessment

There is evidence in the literature that older adults under-report their pain, and thus pain assessments are therefore not accurate and/or may not be done in this population. There is also evidence that inadequate pain management in the elderly patients is due to inadequate assessment (Brown et al., 2003; Eder, Sloan, & Todd, 2003; Gueant et al., 2011). When taken together, the problems of under-reporting and inadequate or missed pain assessments may significantly contribute to oligoanalgesia. Inaccurate or missed pain assessments are a primary predictor of insufficient pain management (Allione et al., 2011). Reasons for failing to assess or re-assess pain include lack of time and staff shortages (Duignan & Dunn, 2008; Hwang et al, 2006; Evans, 2004).

Broader Issues across the studies

There are two broader issues in the literature on oligoanalgesia in the ED. First, many studies included patients presenting to the ED with the complaint of pain, without further investigation into the cause of the pain. This is problematic because pain is likely proportional to

the extent of injury. An important part of this issue is that most studies used heterogeneous samples of patients presenting to the ED with pain, making it difficult to identify any influence of age (Gueant et al., 2011; Dohrenwend et al., 2007; Fry et al., 1999; Platts-Mills et al., 2012; Iyer, 2011; Cordell et al., 2002; Hwang et al., 2010; Allione et al., 2011).

The second problem in the literature is the potential for lack of documentation in patients' records. Hwang (2006) reported that less documentation in the ED was due to overcrowding, unpredictability and variability of ED demands. Lack of documentation could make it difficult to determine the incidence of oligoanalgesia because pain assessment, reassessment and would not be documented. Failure to document related factors, such as patients' cognitive status, willingness to accept analgesia if offered, and pre-medication prior to ED admission could also influence conclusion about the incidence oligoanalgesia. As a result, it would be difficult to determine whether any oligoanalgesia was related to the lack of documentation or to lack of adequate pain management (Allione et al., 2011; Hwang et al., 2010; Cordell et al., 2002; Iyer, 2011; Platts-Mills et al., 2012; Dohrenwent et al., 2007; Gueant et al., 2011; Brown et al., 2003; Hwang et al., 2006). In this pilot study, data about complete, incomplete, and absent pain assessment and reassessment will be collected.

Gaps in the Literature

Although there are a number of investigators who report results that suggest oligoanalgesia in the ED, these results must be interpreted with caution. The lack of studies of homogenous populations with an injury that occurs in both sexes and in both younger and older populations makes it difficult to determine the relative contribution of sex and age. For this reason, I will study a population that is homogenous with respect to injury so that I can examine the effects of sex and age on oligoangesia more closely. Multiple study designs were used

throughout the literature, which means that patients may have been assessed at various points following admission to the ED, and data could be skewed due to this. The best design would be one in which data are collected at the same point in time for all patients. For example, patients assessed for pain at different points in time of their admission to the ED makes it difficult to determine the impact of the pain assessment. Given the retrospective nature of this study, I will not be able to address this problem.

Summary

It appears that elderly patients receive less analgesic and opioid in the ED compared to younger patients, but it is unclear whether this is related to the extent of injury. Second, there appears to be a link between pain assessment and pain management, but pain assessment and pain reassessment are not well documented. Third, many ED health care providers recognize the need for further acute pain management education. The purpose of this pilot study is to begin addressing these problems by examining pain assessment and reassessment in individuals who come to the ED for management of a Colles fracture.

Chapter 3: Methods

Design

A retrospective cohort design was used in this quantitative pilot study of oligoanalgesia in the ED.

Setting

Two emergency departments in Western Canada were chosen as the settings for collecting chart data. Site 1 ED and site 2 ED were chosen because they both have orthopedic surgery and orthopedic inpatient units, they both see a high volume of patients and they are both operated by the same health authority, and thus use the same clinical protocols.

Sample and Sample Size

In order to control for any affects associated with the injury, the sample was comprised of individuals who came to the ED for management of a Colles fracture. This population was selected because Colles fractures occur in both sexes and across a wide range of ages, albeit for different reasons. The inclusion criteria for the sample were: at least 18 years old, admitted to the emergency department at the site 1 ED or site 2 ED in an urban center in Western Canada in the past 5 years with a diagnosis of Colles fracture. Colles fracture patients were selected because the injury is painful and is expected to require pain management and because the FOOSH (fall on out-stretched hand) mechanism of injury is similar across all age groups (Altizer, 2008). In addition, Colles fracture is likely to occur as an isolated fracture and is common fracture seen in the ED. Exclusion criteria will include: multiple fractures, trauma to the head, intoxication, and incomplete charts (demographics or MAR (Medication Administration Record) missing). The target population is adult patients admitted to the ED with Colles fracture that meet inclusion criteria.

There was little information available on the number of patients who were treated for a Colles fracture at each study site per year. I had the opportunity to collect data from two sites, and wanted to make sure I was able to analyze the data separately from each site if the clinical variables differed significantly from each other. Sample size was primarily determined by my interest in determining whether older patients were at risk for oligoanalgesia compared to younger patients. In order to ensure sufficient variability in age, I constructed five age groups between 18 and 80+ years old, and then recruited 15 individuals for age group at each data collection site, for a total of 75 participants per site. I chose to recruit 15 individuals per age group following the approach recommended by Norman and Streiner (2008). Because the clinical characteristics of the samples at my two data collection sites were not significantly different, I did not need to analyze the two sites separately, so the sample size was relatively large considering the requirements and the study being a pilot project.

Data Collection

Data collected included: ED site, age, sex, receipt of analgesia, receipt of opioid, pain assessment, and pain reassessment (see Appendix 1). Identification of charts for this study began following the receipt of a letter of support from the health authority administration and ethics approval from the Research Ethics committee of the University of Alberta. The researcher obtained charts from health records staff. Charts that met inclusion criteria were stratified by hospital site, sex, and five mutually exclusive age groups: 18-34, 35-49, 50-64, 65-79, and 80+.

The data were abstracted on site using an encrypted document, and then transferred to the server in the Faculty of Nursing at the University of Alberta for analysis. The use of pre-existing data reduced results time and the cost of the study. The first 15 charts in each age group were included in the study, for a total of 75 charts per site (n=150). This sample size was selected to

provide reasonably stable data on age and sex for each of the two data collection sites (Site 1 ED and site 2 ED). The resulting sample size was more than adequate for the planned regression analysis and a larger sample size reduces the chance of reporting a type II error (Norman & Streiner, 2008, pp. 157).

A data abstraction tool (see Appendix 1) was designed to collected demographic information (age and sex) and information regarding pain assessment, pain reassessment, pain assessment score, and pain management for all participants in the study. Following completion of this study, the data were transferred to the data repository in Faculty of Nursing, and deleted from the laptop used for this project.

Data Analysis

Statistical analyses were completed using SPSS version 20. A p-value <0.05 was used to determine statistical significance for multivariate analysis and a p-value of <0.10 was used to determine significance for univariate analysis. I also collected the variables: pain severity upon initial pain assessment, drug choice, route of administration, known co-morbidities and repair method to describe my sample population. I dichotomized the age group into two groups, as I was interested in comparing older and younger individuals. Older individuals were those age 65 and over, and younger individuals were defined as those less than 65 years.

Research Question One

The first research question addressed whether analgesia receipt varied by age group, sex, and site in adults with Colles fractures. I began by calculating descriptive statistics to determine frequency distributions and proportions for all variables. Data for each site were analyzed separately. There were no significant differences between sites ($p \geq 0.05$), so data from both sites were combined. Second, a chi-square or Fisher's Exact test was used to determine whether

there was a relationship between: age and receipt of analgesia (yes/no), and sex and receipt of analgesia (yes/no). The independent variables were age and sex and the dependent variable was receipt of analgesia (yes/ no). Chi-square/ Fisher's Exact test was selected as the most appropriate statistical test because the age data were divided into mutually exclusive categories, and both sex and receipt of analgesia were categorical variables. However, when cell frequencies were less than 5, Fisher's exact test was used. A logistic regression approach was used to determine whether the independent variables (age group, sex, and site) predicted the dependent variable, analgesia receipt, and odds ratio and the corresponding 95% confidence intervals were reported.

Research Question Two

The second research question addressed whether patients received an opioid or non-opioid, with a comparison by age group, sex, and site. I began by calculating descriptive statistics to determine frequency distributions and proportions for all variables. The results for each site were analyzed separately. There were no significant differences between sites, so the data for both sites was combined. A chi-square or Fisher's Exact test were again used with age and sex as independent variables and opioid (yes/ no) as the dependent variable. A logistic regression approach was used to determine whether the independent variables (age group, sex, and site) could predict the dependent variable, opioid receipt, and odds ratio and the corresponding 95% confidence intervals were reported.

Research Question Three

The third research question addressed whether site, age group and sex were significant predictors of pain assessment and reassessment. Pain assessment and reassessment were coded yes or no. The relationships of each of the independent variables (age, sex, and site) with pain

assessment score and pain reassessment were calculated using Chi-square or Fisher's exact test. Then, two equations were constructed using a logistic regression approach, one each for pain assessment and pain reassessment. In the first one, the variables that were significantly associated with pain assessment were the predictors, and pain assessment category was the dependent variable. In the second equation, the variables significantly associated with pain reassessment were the predictors and pain reassessment was the dependent variable.

Ethical Consideration

Consent was obtained from hospital administrators and ethics internal review board in order to review charts. Permission to collect data was gained by providing a formal letter about the study to the managers of the Emergency Departments at site 1 and site, and asking them to provide a written letter of approval. The research proposal was then submitted to the Health Research Ethics Board of the University of Alberta. The institutions were made aware that they had access only to summarized results and not to the raw data, in order to protect the participants. I signed a confidentiality agreement in order to protect the identity of the patients. No participant names will be published and only the researchers have access to the raw data.

Chapter 4: Results

Results

In this retrospective chart review, data were collected to assess the potential differences in analgesia receipt, opioid receipt, and pain assessment/reassessment. This chapter presents data obtained from a convenience sample of paper-based charts from site 1 and site. The demographic characteristics of the participants who sustained a Colles fracture and were admitted to one of the two Emergency Departments were described. The differences between age group, sex, and site regarding the dependent variables of analgesia administration, opioid administration, and pain assessment/reassessment will be discussed.

Sample

A review of patient charts for participants with a Colles fracture admitted to site 1 or site 2 between January 1, 2008 and December 31, 2013 resulted in the identification of 150 (N = 150) eligible charts. Seventy-five charts were collected from each hospital site (n = 75). The participants were divided into five mutually exclusive age groups with a total of 30 charts for each age group (15 charts from each site).

Participants

All of the participants in this study received a confirmed diagnosis of Colles' fracture or distal radius fracture. The demographic data is summarized in Table 4.1.

Table 4.1

Sample Characteristics

Variable	N	%
Age Group		
18-34	30	20
35-49	30	20
50-64	30	20
65-79	30	20
80+	30	20
Sex		
Male	28	18.7
Female	122	81.3
Site		
Site 1	75	50
Site 2	75	50
Analgesia		
Yes	136	90.7
No	14	9.3
Opioid		
Yes	133	88.7
No	17	11.3
Pain Assessment		
Yes	131	87.3
No	19	12.7
Pain Reassessment		
Yes	62	41.3
No	88	58.7
Pain Severity Rating		
No Pain	4	2.7
Mild Pain (1-3)	4	2.7
Moderate Pain (4-7)	38	25.3
Severe Pain (8-10)	50	33.3
Not asked about pain at all	19	12.7
Pain assessment without severity	35	23.3
Route of Administration		
Oral	8	5.3

Intramuscular	2	1.3
Intravenous	126	84.0
Missing Information	14	9.3
Repair Method		
Casting	15	10.0
Reduction and Casting	86	57.3
Open Reduction Internal Fixation	40	26.7
Other	9	6.0
Known Co-Morbidity		
No Known Painful Co-Morbidity	99	66.0
Known Painful Co-morbidity	40	26.7
Unknown	11	7.3

The data from the two urban ED sites did not differ significantly statistically on the above variables, as shown in Table 4.2. The definition of elderly population was 65 years and older, (Hwang et al., 2010) and therefore we stratified the age groups in to two different groups, 18-64 as the younger category, and 65 years and older as the elderly category. The hypothesis was that younger population would receive increased analgesia, opioid, pain assessment and reassessment and that is why we chose to divide the groups in order to test this hypothesis.

Table 4.2

Site Differences

	Emergency Department				P
	Site 1 (*N* =75)		Site 2 (*N* =75)		
	n	%	*n*	%	
Analgesia Receipt					
No	4	5.3%	10	13.3%	.159
Yes	71	94.7%	65	86.7%	
Opioid Receipt					
No	1	1.4%	2	3.1%	.607
Yes	70	98.6%	63	96.9%	
Pain Assessment					
No	11	14.7%	8	10.7%	.461
Yes	64	85.3%	67	89.3%	
Pain Reassessment					
No	42	56.0%	46	61.3%	.507

Yes	33	44.0%	29	38.7%

Table 4.3

Age and Sex Distribution by Dependent Variables

Variables	
Analgesia use (N= 136)	
Age	
18-64 years	82 (60%)
65+ years	54 (40%)
Sex	
Male	23 (17%)
Female	113 (83%)
Opioid use (N= 133)	
Age	
18-64 years	80 (60%)
65+ years	53 (40%)
Sex	
Male	23 (17%)
Female	110 (83%)
Pain Assessment (N=131)	
Age	
18-64 years	78 (60%)
65+ years	53 (40%)
Sex	
Male	23 (18%)
Female	108 (82%)
Pain Reassessment (N=62)	
Age	
18-64 years	37 (60%)
65+ years	25 (40%)
Sex	
Male	14 (23%)
Female	48 (77%)

Research Question One

Research question one was: Do age and sex predict receipt of an analgesic in patients with a Colles fracture? Age predicted analgesia receipt, as younger patients were more likely to receive analgesia. Females also appeared to be more likely to receive analgesia, however this association should be interpreted with caution as we had more females than males, see Table 4.4 Univariate logistic regression was used to assess the relationship between analgesic use (yes/no) with age and sex separately. Younger patients (18-64 years) were 1.14 times more likely to receive analgesia than older patients (65+ years), however this was not statistically significant (p= 0.82). In the univariate regression analysis, males were 63% less likely to receive analgesia as compared to females, which was statistically significant (p=0.096), see table 4.5. In the multivariate analysis, when adjusted for sex (male vs. female), younger patients (18-64) were 1.5 times more likely to receive analgesia compared to older patients (65+), however the association was not significant (p=0.52). When adjusted for sex, age predicted 91% of variation in analgesic use. To further assess the relationship of sex and age groups, we ran a stratified analysis based on analgesic use, see Table 4.4. A significant association was found for age with sex for the subgroup of people who received analgesia. Females receiving analgesia were 3.8 times more likely to be older, as compared to males in this sample, which was statistically significant (p=0.02). However there was no association between age and sex for the subgroup who did not have analgesia (p=0.30).

Table 4.4

Frequency of Analgesia use in Age and Sex

	Analgesia Yes n= 136		Analgesia No n= 14		Total N= 150
Age	18-64	65+	18-64	65+	
Men	19	4	4	1	28
Women	63	50	4	5	122
	p=0.019* (Fisher's exact) OR (95% CI) =3.8 (1.2-11.8)[1] *p*=0.023		*p*=0.3		

* *p*-value of <0.05 is statistically significant using Fisher's Exact Test

[1] Odds ratio and 95% confidence interval using logistic regression for stratified analysis

Table 4.5

Does Age and Sex Predict Analgesia Use

Variables	Univariate Analysis Odds Ratio (95%)	*p*-value	Multivariate Analysis Odds Ratio (95%)	*p*-value
Age				
18-64	1.14 (0.37-3.5)	0.82	1.47 (0.45-4.78)	0.52
65+ (reference)				
Sex				
Male	0.37 (0.11-1.19)	0.096*	0.33 (0.95-1.13)	0.08
Female (reference)				

* *p*-value < 0.10 is statistically significant in univariate analysis

Research Question Two

Research question two asked if there was a difference in opioid receipt by age and sex? Age predicted opioid receipt, as younger patients were more likely to receive opioids, but this was not statistically significant. Females also appeared to be more likely to receive opioids, however this association should be interpreted with caution as we had more females than males, see Table 4.6. Univariate logistic regression was used to assess the relationship between opioid use (yes/no) with age and sex separately. Younger patients (18-64 years) were 6% more likely to receive opioids than older patients (65+ years), however this was not statistically significant (p= 0.92). Males were 50% less likely to receive opioids as compared to females, which was not statistically significant (p=0.23). In the multivariate analysis, when adjusted for sex (male vs. female), younger patients (18-64) were 1.2 times more likely to receive opioids compared to older patients (65+), however the association was not significant (p=0.7).

To further assess the relationship of sex and age groups, we ran a stratified analysis based on opioid use, see Table 4.6. A significant association was found for age with sex for the subgroup of people who received opioids. Females were 3.8 times more likely to be older, as compared to males in this sample, which was statistically significant (p=0.02). However there was no association between age and sex for the subgroup who did not have opioids using Fishers Exact test (p=0.34)

Table 4.6

Frequency of Opioid Receipt in Age and Sex

	Opioid Yes n= 133		Opioid No n= 17		Total N= 150
Age	18-64	65+	18-64		
			65+		
Men	19	4	4	1	28
Women	61	49	6	6	122
	p-value= 0.019*		*p*-value= 0.34		
	OR (95% CI) =3.8(1.2-12.0) [1]				
	p=0.022				

* *p*-value of <0.05 is statistically significant using Fisher's Exact Test

[1] Odds ratio and 95% confidence interval using logistic regression for stratified analysis

Table 4.7

Does Age and Sex Predict Opioid Use

Variables	Univariate Analysis Odds Ratio (95%)	*p*-value	Multivariate Analysis Odds Ratio (95%)	*p*-value
Age				
18-64	1.06 (0.38-2.95)	0.92	1.23 (0.42-3.60)	0.70
65+ (reference)				
Sex				
Male	0.50 (0.16-1.56)	0.23	0.47 (0.15-1.54)	0.21
Female (reference)				

Research Question Three

Research question three was: Do age and sex predict the receipt of a pain assessment and pain reassessment? Most patients (87%) with a Colles fracture received an initial pain assessment at some point during their admission to the ED. Older patients were more likely to have a pain assessment than younger patients, and females were more likely than males to receive a pain assessment, but none of this was statistically significant. Table 4.8 shows the descriptive statistics. Univariate logistic regression was used to assess the relationship between

pain assessment (yes/no) with age and sex separately. Younger age (18-64 years) were 14% less likely to receive a pain assessment as compared to older age (65+ years), however this was not statistically significant (p= 0.76). Males were 31% less likely to receive a pain assessment as compared to females, which was not statistically significant (p=0.36). In the multivariate analysis, when adjusted for sex (male vs. female), younger patients (18-64 years) were 5% less likely to receive a pain assessment compared to older patients (65+ years), however the association was not significant (p=0.92) (Table 4.9).

To further assess the relationship of sex and age groups, we ran a stratified analysis based on pain assessment, see Table 4.8. A significant association was found for age with sex for the subgroup of people who received a pain assessment. I found that females were 3.9 times more likely to be older (65+), as compared to males in this sample (p=0.019). However there was no association between age and sex for the subgroup who did not have a pain assessment using Fishers Exact test (p=0.60). Females were more likely to receive a pain assessment, however this association should be interpreted with caution as we had more females than males, see Table 4.8.

Table 4.8

Frequency of Pain Assessment in Age and Sex

	Pain Assessment Yes n= 131		Pain Assessment No n= 19		Total N= 150
	18-64	65+	18-64	65+	
Men	19	4	4	1	28
Women	59	49	8	6	122
	p= .019* OR=3.9(1.3-12.4) [1] p=0.019		p= .603		

*= statistically significant p- value <0.05

[1] Odds ratio and 95% confidence interval using logistic regression for stratified analysis

Table 4.9

Does Age and Sex Predict Pain Assessment

Variables	Univariate Analysis Odds Ratio (95%)	*p*-value	Multivariate Analysis Odds Ratio (95%)	*p*-value
Age				
18-64	0.86 (0.32-2.32)	0.76	0.95 (0.34-2.64)	0.92
65+ (reference)				
Sex				
Male	0.69 (0.20-1.82)	0.36	0.61 (0.19-1.91)	0.39
Female (reference)				

The second part of question three asked if age and sex predicted the receipt of a pain reassessment? Univariate logistic regression was used to assess the relationship between pain reassessment (yes/no) with age and sex separately. Younger age (18-64 years) and older age (65+ years) were nearly equally as likely to receive a pain reassessment with an odds ratio of 0.98 however this was not statistically significant (p= 0.95). Males were 1.5 times more likely to receive a pain reassessment as compared to females, which was not statistically significant (p=0.30). In the multivariate analysis, when adjusted for sex (male vs. female), younger patients (18-64 years) were 10% less likely to receive a pain reassessment compared to older patients (65+ years), however the association was not significant (p=0.76).

To further assess the relationship of sex and age groups, we ran a stratified analysis based on pain reassessment, see Table 4.10. A significant association was found for age with sex for the subgroup of people who received a pain reassessment using Fisher's Exact test (p=0.005). Females were 13 times more likely to be older (65+), as compared to males in this sample (p=0.017). Therefore, age and sex were predictors of a pain reassessment. The number of patients who received a pain assessment was 131, and out of that number, only 62 were

reassessed for pain, and therefore only 47% of these patients received a pain reassessment, instead of the preferred 100%. When we tested the number of patients who actually received a pain reassessment against the gold standard of 100% reassessment, the result was significant (p=0.0002), meaning that the number who received a pain assessment was significantly lower than required by best practice guidelines.

Table 4.10

Frequency of Pain Reassessment in Age and Sex

	Pain Reassessment Yes n= 62		Pain Reassessment No n=88		Total N= 150
Age	18-64	65+	18-64	65+	
Male	13 (35%)	1(4%)	10 (19%)	4 (11%)	28
Female	24 (65%)	24 (96%)	43(81%)	31(89%)	122
	p-value 0.005*		*p*-value 0.39		
	OR (95% CI) =13.0(1.6-107.3) [1] p=0.017		OR (95% CI) =1.8 (0.5-6.3) [1] p=0.36		

* *p*-value of <0.05 is statistically significant using Fisher's Exact Test
[1] Odds ratio and 95% confidence interval using logistic regression for stratified analysis

Table 4.11

Does Age and Sex Predict Pain Reassessment

Variables	Univariate Analysis Odds Ratio (95%)	*p*-value	Multivariate Analysis Odds Ratio (95%)	*p*-value
Age				
18-64	0.98 (0.5-1.9)	0.95	0.90 (0.46-1.78)	0.76
65+ (reference)				
Sex				
Male	1.54 (0.68-3.52)	0.30	1.59 (0.68-3.7)	0.29
Female (reference)				

Chapter 5: Discussion

This study addressed a gap in knowledge regarding the incidence of oligoanalgesia in adult Colles fracture patients admitted to an urban ED. This pilot study confirmed the trends reported in previous literature that older patients (65 years and over) are indeed less likely to receive analgesia or opioid. This pilot study provided some evidence for the study hypothesis. Even though the results did not show statistically significant results, further investigation and study will be useful in reconfirming the hypothesis with statistical significance. In this chapter, the findings of this study will be discussed with relevance to existing literature.

Analgesia

I initially explored whether there was a relationship between age, sex and analgesia in the emergency department after a Colles fracture. Current research shows that analgesic use in the older adult population in the ED is minimal (Herr et al., 2009). The literature states that older adults are at risk of not being treated with analgesia compared to the younger cohort (Hwang et al., 2013; Platts-Mills et al., 2012; Hwang et al., 2010; Heins et al., 2006; Brown et al., 2003). However, I found that 93% of adults age 65-79 and 87% of adults over 80 years old received analgesia during their ED admission. I did find that younger patients were more likely to receive analgesia compared to older patients, but this was not significant. The literature reports that analgesia given in the ED for fracture pain is between 31% and 74%, (Brown et al., 2003), but in this study 90% of admitted patients received analgesia overall.

I also found that females were more likely than men to receive analgesia, which was statistically significant. This finding is in agreement with the work of Hwang et al. (2006) and Motov and Khan (2009), who reported that men received analgesia less frequently than did women. These findings are contrary to other studies, in which authors found that being female

was a risk factor for under treatment of pain (Iyer, 2011; Hwang et al., 2006). However, the sample in my study was 81% female and they were significantly more likely to be older than the males in this sample, and therefore this result must be interpreted with caution.

Opioids

I also examine whether age and sex were associated with receipt of an opioid during ED admission. Current literature states that older adults are less likely to receive an opioid analgesic compared to the younger cohort when visiting the ED with a pain related issue (Platts-Mills et al., 2012; Hwang et al., 2010). Iyer (2011) found that there was no association between progression of age and incidence of receiving an opioid. Older adults with a clavicle fracture were a third less likely to receive an opioid compared to the younger groups (Dohrenwend et al., 2007). In this study, I found that younger patients received opioids more frequently than did their older counterparts, but this finding wasn't significant. In fact, 89% of all patients admitted to the ED with Colles fracture received an opioid. Interestingly, this number may be because 57% of patients had their fracture reduced and casted, which required conscious sedation using some form of analgesia.

Similarly to the findings with analgesic use, I found that females were more likely to receive opioids than males. Once again, this result should be interpreted with caution as this sample had significantly more females than males, which may have biased the results.

Pain Assessment

Optimal management of acute pain in the ED requires a pain assessment (Hwang & Platts-Mills, 2013). Some authors found no significant difference in the incidence of pain assessment documentation across age groups (Hwang et al., 2010; Eder et al., 2003). Other authors have reported that as age increases, the likelihood of having a documented pain

assessment decreases (Iyer, 2011; Hwang et al., 2006). I found that 87% of all patients received an initial pain assessment, and 64% of these assessments were conducted using a numeric rating scale (NRS) for pain. An additional 23% of patients received a pain assessment that did not include assessment of severity, meaning the health care professional may have simple charted "pain" or used a non-NRS scale. Herr & Titler (2009) found that the majority of patients with a hip fracture had some documentation of pain, including the use of the NRS or another non-NRS scale. I found that younger patients were less likely to receive a pain assessment compared to the older patients, but this finding was not significant.

Eder et al., (2003) found no differences in the frequency of pain documentation and sex in a retrospective review of pain documentation in the ED. A literature review by Motov & Khan (2009) also found no difference between sex and the frequency of pain assessment. Interestingly, I found that males were less likely to receive an initial pain assessment compared to females, but this finding was not significant. I also found that males in my sample were significantly younger than the female participants. These results must again be interpreted with caution, as 81% of participants were female.

Pain Reassessment

The complexity of managing acute pain in the ED, especially in the elderly population, requires frequent pain reassessment to determine whether the pain management intervention in use is effective. Failure to reassess pain is a common reason for oligoanalgesia in older adults (Hwang & Platts-Mills, 2013; Gueant et al., 2011). The current recommendation for pain assessment in older adults in an acute care setting is initial assessment followed by reassessment every 4 hours (Herr & Titler, 2009). Eder et al., (2003) found that pain reassessment was documented in 40% of complete charts. My findings were similar, with pain reassessment

documented in 41% of all patient charts. I also found that of those in my study who received an analgesic for pain, only 52% had a pain reassessment during their ED admission. These results are significantly different than the best practice standard, which is to reassess pain in 100% of patients, especially if they have received a pain intervention (p= 0.0002).

One study found that age did not predict pain reassessment (Hwang et al., 2010). My findings were similar, in that older and younger patients were about equally as likely to receive a pain reassessment.

Interestingly, I found that males were more likely to receive a pain reassessment compared to females, even though they were less likely to receive an initial pain assessment. This result was not statistically significant, but further investigation may be warranted, in order to evaluate the possibility of gender bias in pain reassessment.

Limitations

This study has a number of limitations. The most significant limitation was the disproportion of females to males. Interpretation of the findings were complicated by the small number of males in the sample. The decision to not have a relatively equal number of males to females in the sample added to the complexity of interpretation, and perhaps lack of statistically significant results.

Another potential limitation was that due to the retrospective nature of the design, this study did not account for the possibility that patients may have received analgesics or opioids prior to arrival to the ED. Another limitation is the possibility that ED staff administered analgesia, and simply did not record it. It is also possible that a pain assessment or reassessment was done and not recorded. The retrospective nature of this study limits the ability to ascertain why a patient may have not received an analgesic. The patient could have refused analgesia, and

this cannot be captured using a retrospective design. This study also did not take into account ED crowding on a particular day, which may impact receipt of analgesia, opioid, pain assessment and reassessment. This study also did not take into account ethnic or racial bias that may occur. This study excluded patients with head trauma, frequent analgesia/opioid use, and intoxication, but it is possible that this information was incompletely recorded. Another potential limitation of this study was that it was impossible to measure the influence of family or friends on patient care management decisions. Although we used a homogenous injury, Colles fracture, in the absence of other trauma, we cannot be sure that the injuries sustained in each patient group were equally painful. This retrospective study was also unable to capture the possible reluctance to prescribe analgesia or opioids to certain populations due to fear of misuse, dependence, and adverse effects. Finally, because this was a retrospective cohort study conducted in only two urban EDs, the results may not be generalizable to all ED settings.

Power

Because this was a pilot retrospective study, we did not have the prior information required to calculate the sample size. The sample size calculator from Norman & Streiner (2008) was used to estimate the sample size. This rule of thumb states that 10 events should be used per predictor variable, and I used age, sex and site as predictors. Hence I was required to use approximately 90 participants (five age groups, two sexes and two sites), and I chose to use collect information from 150 charts to ensure I had enough events for each predictor variable (Vittinghoff & McColloch, 2006). Many of the results of this study were not statistically significant and therefore we ran an analysis to test if this study was underpowered (Table 5.1). We found that this study was underpowered, most likely because the number men were small. In future studies an equal number of men and women within each age group should be recruited.

Table 5.1

Power Analysis for the Statistical Testing

Variable	Outcome Variable	N1	N2	Odds Ratio	Power
Sex	Analgesia	122	28	0.37	65%
	Opioid	122	28	0.502	38%
	Pain Assessment	122	28	0.596	24%
	Pain Reassessment	122	28	1.542	18%
Age group	Analgesia	90	60	1.139	7%
	Opioid	90	60	1.057	7%
	Pain Assessment	90	60	0.858	5%
	Pain Reassessment	90	60	0.977	6%

Chapter 6: Implications for Practice, Research, Education, and Policy

The findings of this study raise implications for clinical practice, research, education, and policy.

Implications for Clinical Practice

My findings strengthen the reports in the literature concerning inadequate pain assessment documentation in the ED. A thorough pain assessment with frequent reassessments is imperative for effective pain management (Iyer, 2011). Lack of pain assessments/reassessments has been linked to a decreased likelihood of a patient receiving analgesics (Platts-Mills et al., 2012). The indication from this study is that the majority of patients do not receive a pain reassessment after a pain management intervention. Thus, we do not know how many patients are leaving the ED with pain, which may require self-medication at home, or a visit to another health care professional such as a family physician or walk-in clinic, or even a revisit to the ED for acute pain management. If pain is inadequately managed in the ED, this may affect a patient's quality of life and impact the cost to the health care system through the further use of health care services.

Even though the rate of analgesia and opioid receipt was not significantly linked to age as predicted, nurses must continue to advocate for appropriate pain management, especially in the elderly population as other researchers have found that older individuals are at greater risk for oligoanalgesia. Pain assessment and reassessment could contribute to a reduced incidence of oligoanalgeia, as nurses and physicians would be cognizant of a patient's pain experience.

Implications for Research

This was a pilot study, as I could not find other studies that focused on a homogenous ED diagnosis such as Colles. This fracture was specifically chosen because it is experience by both older and younger individuals. With that in mind, it may be beneficial to do a prospective study with similar variables, but also incorporate other factors known in the literature to affect the incidence of oligoanalgesia in the ED, which were impossible to capture using a retrospective design. Table 6.1 summarizes some additional factors identified by other researchers that could be included in a prospective study.

Table 6.1

Additional Variables Influencing Oligoanalgesia

Factor	Reference
Ethnicity	Hwang et al., 2010; Herr & Titler, 2009; Jones et al., 1996
Language spoken	Decosterd, Hugli, Tamches, Blanc, Mouhsine, Givel, &…Buclin, 2007
Level of education	Decostered et al., 2007
Socioeconomic status	Decostered et al., 2007
ED crowding (census)	Hwang et al., 2006
Health care provider attitudes to pain management	Motov & Khan, 2009
Time to initial pain assessment/ reassessment	Hwang et al., 2010
Time to initial analgesia/opioid	Hwang et al., 2010; Brown et al., 2003

To-go prescription receipt for analgesia/opioid	Heins et al., 2006
Discharge status (In-patient, OR, home)	Gueant et al., 2011; Decostered et al., 2007; Jones et al., 1996
Type of analgesia given (what drug)	Gueant et al., 2011; Heins & Titler, 2009
NRS vs. non-NRS used	Herr & Titler, 2009
Patient self-medicated prior to ED admission	Fry et al., 1999

In addition to the variables noted in Table 5.0, I would also like to capture the frequency of patients' returns for additional pain management therapy to another healthcare professional or the ED within the two weeks following discharge. I would also like to explore the patient's perceived satisfaction with pain management during the ED admission. It would be interesting to explore if the rate of pain reassessment is minimal in other painful injuries or conditions besides Colles' fracture.

Implications for Education

Nurses are the most numerous health care professionals in the ED, and provide most of the direct patient care. Nurses therefore have the greatest opportunity to improve patient outcomes following introduction of pain management education. Such education may help to reduce opiophobia and the misconception that elderly patients do not experience as much pain as the younger cohort (Pretorius, Searle & Marshall, 2014). Pain management education session in the ED should include information about the importance of using validated scales for pain assessments, and reassessments, clear indications for opioid vs. non-opioid analgesia, and

information about acute pain management. The introduction of good acute pain education in the ED could result in increased acute pain management, increased quality of life, and increased satisfaction with pain management in the ED.

Implications for Policy

Although most patients admitted to the ED received analgesia, an opioid, and an initial pain assessment, an alarming majority did not receive a pain reassessment after having received analgesia. This was a pilot study, and therefore additional research would be required in order to inform any policy changes, but the findings of this study suggest that guidelines for the clinical management of acute pain, including an algorithm to prevent oligoanalgesia in the ED, are needed. The development of standardized nursing triage protocols may also be helpful. One option could be the addition of prompts in the patient progress charting for nurses or physicians to reassess pain, including it as a fifth vital sign with tracking every 4 hours if applicable. Future studies could determine if a preformatted chart including pain reassessment and the use of validated pain scales improve the efficiency of pain management in the ED and patient satisfaction. Analgesia protocols for triage have reduced the wait time for pain management, so the addition of a protocol to these EDs may improve pain management and patient satisfaction (Heins et al., 2006). Further involvement of the healthcare professionals working in the ED would be required to address improvement in treatment strategies for acute pain in the ED. There are some guidelines in existence that helps direct acute pain management in the elderly, and this may be a useful tool to include in future policy formation (Table 6.2).

Table 6.2

Guidelines for Acute Pain Management in the Elderly

1. Elderly patients should be asked regularly about pain. The intensity of pain should be assessed quantitatively (eg. NRS) to avoid misunderstanding.
2. In patients with fractures, target analgesia to times of likely patient movement, such as prior to radiographs or admission to the hospital.
3. Use opiates with a short half-life.
4. Use adjunctive medications to improve pain control; this may allow a lower opioid dose or counteract side effects.
5. Patients with moderate to severe pain should have their opioid analgesics given intravenously. The patient can be given small serial doses of IV opioids to safely and effectively relieve pain
6. Use analgesic drugs correctly. "Start low and go slow" remains the best rule. Achieve adequate doses and anticipate side effects.
7. NSAIDS should be prescribed cautiously in patients with preexisting renal disease, heart failure, hypertension, peptic ulcers, or bleeding diatheses.

Table 5 data adapted from "Age as a risk factor for inadequate emergency department analgesia" by J. Jones, K. Johnson, & M. McNinch, 1996, *American Journal of Emergency Medicine, 14*(2), 157- 160.

Conclusion

There is a paucity of research on oligoanalgesia in the ED in populations with a homogenous painful injury. Overall, the results of this study, while limited, do provide some direction for further study of the incidence of oligoanalgesia in the ED. The results of this study indicate that differences do exist in acute pain management of older and younger adults in the

ED, although this difference was not significant. These differences may become significant if a larger sample size can be obtained. The results also indicate that an improvement in the rates of pain reassessment may minimize the incidence of oligoanalgesia in the ED. While the results of this study were for the most part, not statistically significant, appropriate acute pain management remains a very important clinical objective. Due to the negative impact that pain can have on the health and functionality in older adults, appropriate and effective pain management is important in this population. An increased understanding of the variables (Table 4) that may impact the incidence of oligoanalgesia can provide insight into effective clinical interventions that would minimize this risk.

Continued exploration into other variables that impact oligoanalgesia, and the rationale for the significant lack of pain reassessments in the ED need to be explored. In order to address the lack of reassessment, standardized means of documenting pain initially and after intervention may be required. The effects of acute pain management could be studied by examining patient satisfaction and rate of return for additional acute pain management strategies. Oligoanalgesia in older adults remains an important topic of interest. Findings from this study support the need for further exploration in this area of clinical practice.

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Appendix A

Codebook

Variable Number	**Variable Description**	**Label**	**Value**	**Coding**
1	Participant ID	ID#	001-200	001-100= site 1 101-200= site 2
2	Emergency Department	Site	1, 2	1= site 1 2= site 2
3	Age	Age	1,2,3,4,5	1= 18-34 2=35-49 3= 50-64 4= 65-79 5= 80+
4	Sex	Sex	0, 1	0= Female 1= Male
5	Analgesia	Analgesia	0, 1	0= no analgesia 1= analgesia
6	Opioid	Opioid	0, 1	0= no opioid 1= opioid
7	Pain Assessment NRS/VRS	Pain Assessment	0, 1	0= no assessment 1= assessment
8	Reassessment of pain	Pain Reassessment	0, 1	0= no reassessment 1= reassessment
9	Pain severity upon initial pain assessment (covariate)	Pain severity	0, 1, 2, 9	0= mild pain (0-3) 1= moderate pain (4-6) 2= severe pain (7-10) 9= missing data
10	Drug Choice (covariate)	Drug	Manually recorded	Manually recorded
11	Route of Administration (covariate)	Route	0, 1, 2, 3, 4, 5, 9	0= PO 1= IM 2= IV 3= SC 4= IN 5= other 9= missing data
12	Repair Method (covariate)	Repair	0, 1, 2, 3, 9	0= casting 1= reduction and casting 2= ORIF 3= other 9= missing data
13	Known Co-morbidity	Co-morbidity	0, 1, 2	0= no known painful comorbidity 1= known painful

				comorbidity 2= unknown