1997

Pain Management Practice in the Acute Adult Trauma Patient

Sally B. Ossewaarde
Grand Valley State University

PAIN MANAGEMENT PRACTICE IN THE ACUTE ADULT TRAUMA PATIENT

By

Sally B. Ossewaarde

A THESIS

Submitted to
Grand Valley State University
in partial fulfillment of the requirements for the
degree of

MASTER OF SCIENCE IN NURSING

Kirkhof School of Nursing

1997

Thesis Committee Members

Patricia Underwood, Ph.D., R.N.

Steve Merrill, M.S.N., R.N.

Theresa Bacon-Baguley, Ph.D., R.N.

ABSTRACT

PAIN MANAGEMENT PRACTICE IN THE ACUTE ADULT TRAUMA PATIENT

By

Sally B. Ossewaarde

The purpose of this study was to compare the pain management of acute adult trauma patients during the first hour of resuscitation at a Level I Trauma Center versus non Level I Trauma Center Emergency Departments.

A descriptive two group comparison design was used for this study. The sample consisted of 74 patients at the Level I Center and 65 patients at the non Level I Centers. Data was obtained through a retrospective chart review. Type, route, dose of analgesic, time from admission to first dose, and number of consecutive doses were determined and analyzed by chi-square and independent t-test.

At the Level I Trauma Center only intravenous narcotics were administered in comparison to intravenous and intramuscular narcotics and noon-steroidal anti-inflammatories administered at the non Level 1 Centers. Time from arrival to the administration of the first dose was significantly shorter and quantity of medication was significantly greater at the Level 1 Trauma Center than at the non Level 1 emergency departments supporting the hypothesis that the Level 1 Trauma Center is more aggressive in the management of pain for acute adult trauma patients.

Table of Contents

Table of Contents

List of Tables

List of Figures

FIGURE

List of Appendices

CHAPTER 1

INTRODUCTION

Trauma is the leading cause of injury and death in the first four decades of life. Trauma has no respect for age, presents without warning, and frequently causes profound loss of functions for the persons involved. The quality of the initial rapid assessment and management of a severely injured patient influences the trauma patient's final outcome--an organized approach affords an optimal outcome (Snyder, 1993).

The acute adult trauma patient often experiences a great deal of pain based on the injuries sustained. It has been found that trauma pain is a problem of unknown extent (Stanik-Hutt, 1993), frequently undertreated, resulting in patients suffering (Christoph, 1991).

In the acute care setting pain is frequently misinterpreted. Pain is considered not to be present when the patient may have ingested alcohol, is combative, or unresponsive. In turn, the management of pain may be ignored because the health care provider does not consider pain management a priority intervention. Bostrom and Batina (1994) found that nurses may have mistakenly believed that quiet patients were pain-free patients, and Stanik-Hutt (1993) noted that the absence of pain behaviors does not mean the absence of pain.

Perception of pain varies widely among medical staff, and evidence suggests that

pain is frequently under treated (Mackersie & Karagianes, 1990). Physicians do not want to mask possible injuries, and nurses fear that the patient will become addicted to pain medication. In turn, healthcare professionals have the ethical obligation to manage and relieve pain and suffering appropriately (Gujol, 1994).

Further research indicates that adverse effects of unrelieved pain are likely to manifest themselves in failure in more than one organ system (Cousins, 1989). Inadequately managed pain can cause significant physiological and psychological stress and may have a negative impact on patient recovery (Ballard, 1981; O'Gara, 1988). In the subpopulation of the critically ill trauma patient, expert pain management is crucial to maximize the chance of recovery (Kaiser, 1992). It is possible for acute severe unrelieved pain to result in significant morbidity and even mortality (Cousins, 1989; Murray, 1990)

Studies that look at how pain is managed once the injured trauma patient has been admitted to the critical care unit have been conducted (Kaiser, 1992). However, no studies were found in the literature that specifically investigated the pain medication administration practice in the trauma and emergency center.

Purpose

The purpose of this study was two fold: (a) to describe the pain medication administration practice present in caring for the acute adult trauma patient during the first hour of care in the emergency department, and (b) to determine if there was a difference between the pain medication practices at the Level 1 Trauma Center in caring for the acute adult trauma patient versus the pain medication practice at a non Level 1 Trauma Center.

CHAPTER 2

CONCEPTUAL FRAMEWORK AND LITERATURE REVIEW

Conceptual Framework

The conceptual framework used in the study was the Neuman Systems Model. This model is an open systems model that views nursing as being primarily concerned with assessing possible reactions of the client/clients systems and defining appropriate action in stress related situations. Since environmental exchanges are reciprocal, both client and environment may be positively or negatively affected by each other (Neuman, 1982). The model focuses on an individual's perception of and reaction to stressors and factors that maintain equilibrium or facilitate reconstitution.

Using the model, the individual system is viewed as a series of concentric circles that protect the energy resources, or core structure (see Figure 1). The normal line of defense is the model's outer solid circle. It represents a stability state for the individual. The outer broken ring is the flexible line of defense that can be rapidly altered over a short period of time. It is perceived as a protective buffer for preventing stressors from breaking through the solid line of defense. The series of broken rings surrounding the basic core structure are called the lines of resistance. These rings represent resource factors that help the client defend against a stressor. A stressor can be an intrapersonal force occurring within the individual, an interpersonal force that occurs between one or

more individuals, or an extrapersonal force that occurs outside the individual (Neuman, 1982). How a person reacts to these stressors is individualistic. Factors that may influence the response are: time of occurrence, past and present conditions of the individual, nature and intensity of the stressor, and the amount of energy required to adapt to all of the variables. Neuman (1982) also identified three areas of prevention that may help an individual through a stressful period: primary prevention, secondary prevention, and tertiary prevention.

Primary prevention occurs before the encounter with a stressor and encompasses educating a person on what may cause a stress and measures to take to prevent the situation from occurring. Secondary prevention relates to symptomatology following a reaction to stress. Tertiary prevention is the restoration or maintenance of optimal wellness following treatment. Secondary prevention was the focus in this study.

Secondary prevention focuses on the client's internal and external resources that could be used to stabilize and strengthen internal lines of resistance, reduce the reaction, and increase the resistance factors. If the individual is unable to adapt to the stressors during this phase, death occurs as a result of the failure of the basic core structure to support the intervention. The pain experienced by a trauma patient will disrupt the normal line of defense and create a state of disequilibrium. When the pain is not treated or under treated, the lines of resistance will be disrupted and drain the core structure of its energy. In turn this may lead to death of the patient.

Using Neuman's Systems Model helps to identify reactions to stressors and facilitates early intervention that may promote a positive outcome in dealing with the

stressor. Insensitivity to the pain a person is experiencing may impair the response this same person has to other therapeutic interventions. Early identification of the presence of pain and administration of pain medication may prevent an individual from having an unoptimal outcome.

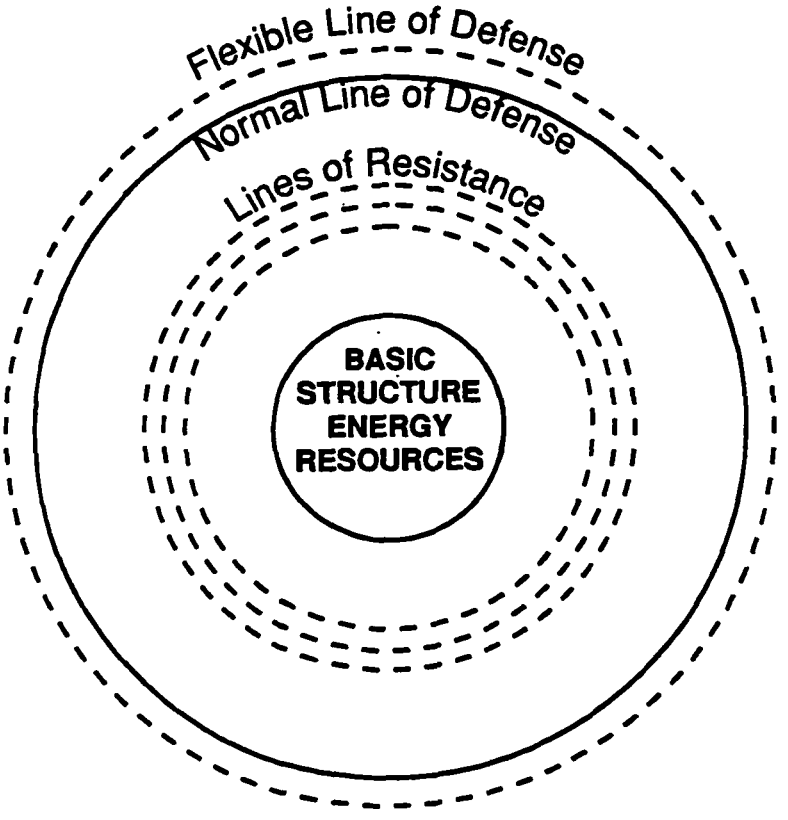

Figure 1 Neuman's Systems Model

Literature Review

Introduction Current literature reflects an increase in the amount of research done in the area of pain. Specific areas that have been extensively researched include pain in association with burn injury, cancer pain, postoperative pain, development of pain scale measurement tools, and healthcare providers' perceptions of pain. Many articles reference the need to pursue research in the area of pain management in trauma, yet the literature indicates that this has not been extensively researched. An extensive literature search conducted in preparation for this research study did not find any articles specific to pain management in the acute setting when caring for the adult trauma patient.

Implication for pain medication administration In the adult trauma patient, pain frequently is not prioritized as an early intervention and in some cases pain is not addressed at all. The literature describes pain as an "unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage" (Stanik-Hutt, 1993). According to Murray (1990) pain is a subjective experience and best judged by the patient, not the physician or nurse.

Pain is what the patient states it is (McCaffery, 1979). Many psychological, sociocultural and situational factors are known to influence the way individuals perceive, react to and express pain, making the pain experience a unique and distinctive phenomenon for each person (Choiniere, Melzack, Girard, Rondeau & Paquin, 1990).

For individuals who are not able to verbalize that pain is present, members of the health care team need to be aware of other indicators that identify pain is present. For intubated or incoherent patients, physiologic clues (tachycardia, hypertension ,

restlessness) may aid in determining the need for analgesia (Murray, 1990). Kaiser suggests that restlessness, agitation, sweating, pallor, pupillary dilatation, increased heart rate, increased blood pressure, and moaning, grimacing or flinching either spontaneously or with passive movement may be some of the signs of pain in the unconscious patients (1992) and (Leisifer, 1990). Additional factors that may influence the way an individual expresses discomfort include age, sex, ethnic background of the patient, concurrent psychiatric problems and economic hardship (Boisaubin, 1989).

In the Textbook of Pain (1984) Michael Cousins wrote a chapter regarding acute and postoperative pain. In this text he reviewed the pathophysiology of pain and the affects pain has on the systems of the body. He states that severe acute pain results in abnormally enhanced version of the physiological and psychological responses that may result in significant dysfunction in a substantial number of organ systems which may progress to organ damage or even failure.

Uncontrolled pain can adversely affect every body system. When a patient has experienced a traumatic event the sympathetic system in the body responds immediately. Abdominal and thoracic pain often cause reductions in tidal volume, vital capacity, functional residual capacity, and alveolar ventilation. As a result the patient may retain pulmonary secretions, develop atelectasis or pneumonia. The gastrointestinal tract responds by increasing intestinal secretions and smooth muscle sphincter tone, and decreasing intestinal motility. This leads to paralytic ileus and possible bowel necrosis. The circulatory response to pain causes tachycardia, hypertension and increased systemic vascular resistance. This may mask the signs of hypovolemia, causing failure to give

sufficient fluid for resuscitation. These adverse effects of unrelieved pain are likely to manifest themselves in failure in more than one system.

Cousins (1984) writes that pain is generally not effectively treated. There is evidence that unrelieved acute pain may result in harmful physiological and psychological effects. These effects may result in significant morbidity and even mortality.

Practice of pain medication administration. Three specific issues repeatedly show up in the literature that indicate why patients are not medicated for pain. First, physicians fear that medicating a patient will mask symptoms and an injury diagnosis will be missed. Second, nurses fear patients will become addicted to the opiates or experience episodes of respiratory depression. Third, physicians have not been properly educated on the properties of pain medications, specifically duration and dosage.

Boisaubin (1989) states that physicians working in emergency centers have long been concerned about the potential risks of masking important signs and symptoms that are necessary for diagnosis and do not medicate patients for pain based on this premise. However, Silen (1983) states that small doses of an intravenous narcotic might be administered to reduce the intensity of pain without eliminating important signs and symptoms and a narcotic antagonist could be used if reversal were necessary.

Physicians also tend to undertreat pain because of psychic numbing, bias against demanding patients, and/or fear of over medicating or actual addiction (Boisaubin, 1989). The likelihood of a patient becoming addicted to opiates in the hospital setting has been found to be less than one percent of the patient population. An overemphasis on the problem of addiction may lead to decreased prescribing and administration of narcotics to

hospitalized patients and, consequently, an increase in the patient's pain and suffering.

Marks and Sachar (1973) conducted a two part study after psychiatrists found that patients were not being adequately treated with analgesics. The first part of the study was an interview of 37 medical inpatients consecutively hospitalized and treated for pain. The patients were asked questions regarding how they felt about their pain after a surgical procedure. Patient charts were then audited for the type of medication prescribed, dosage, and time interval for administration.

The data reflected that 32% of patients remained in severe distress from pain, 41% were in moderate distress from pain and 27% were in minimal distress from pain. Twenty-three of the 37 patients reported significant return of pain before the next dose. From this information they concluded there was a general pattern of under treatment of pain with narcotics, leading to widespread and significant patient distress.

The second part of the study asked two questions: What leads physicians to use narcotic analgesics in this less than effective way and what information, ideas, and attitudes enter into these decisions about the treatment of pain? The investigators developed the Physicians' Drug Questionnaire consisting of 25 multiple choice questions, mostly clinical vignettes.

Physicians were asked to choose the course of treatment from several alternatives. This survey was mailed to medical house staff in two different institutions. More than 70% of the house staff returned the questionnaires, for a total of 102. The results of this survey found that 100% of the physicians indicated that their aim in the treatment of pain was either complete relief or enough relief to eliminate distress. Second, the doctors

indicated they would prescribe meperidine in doses lower than were required to relieve pain. The doses the physicians actually used on the wards were lower than those the physicians responding to the questionnaire said they would use. Thirty-three percent of the physicians were unaware that the average duration of action of intramuscular meperidine is about 3 hours, and many did not realize that an oral dose of meperidine is only one third to one half as effective as an intramuscular dose. Third, there was an overall lack of understanding about addiction. The greater the doctor's estimate of the danger of addiction, the lower were the doses of medication prescribed. The study concluded that re-education of physicians about the proper and adequate use of narcotic analgesics is greatly needed.

In a survey by Watt-Watson (1987) 106 graduate nurses and 101 baccalaureate nursing students were asked to respond to 18 questions regarding nurses' knowledge of pain issues. The data reflected that 66% of the graduate nurses and 63% of the baccalaureate students felt that 10% or more of hospitalized patients would become addicted to pain medication while hospitalized. This study also identified three nursing problems in managing pain with narcotics: fear of addiction, a lack of knowledge about narcotic doses, and lack of knowledge of side effects and duration of narcotics. McCaffery (1979) presented a five part series of surveys conducted to explore variables affecting nurses' decisions regarding pain control. It was found that accepting a patient's report of pain intensity and selecting the appropriate medication dosage were affected by the nurses' misconceptions related to concerns of addiction, physical dependence, tolerance to the drug, and respiratory depression. In a more recent series study by

McCaffery and Ferrell (1991 & 1992) 1781 nurses were surveyed about pain management decision making. Nurses were given clinical vignettes that described 2 patients. In all of the scenarios it was reported that the patients had similar injuries, pain of 4 on a 0 to 5 scale, 10 mg of morphine had been administered 3 hours prior to the assessment time and the medication range for morphine was 5-15 mg every 3-4 hours as needed. The results of this study showed that 68% of the nurses would record the pain score as a 4 and only 44% would administer an increased dose of morphine. Factors identified through these studies that influenced nurses decision making included patient behavior, age, vital signs and life-style.

Hamilton and Edgar (1992) surveyed 318 nurses regarding their knowledge of pain control. Part one of the survey examined nursing knowledge of opiod classification and opiod effects and part two consisted of 20 true/false statements on pain assessment and management issues. Results of the first part of the survey found that nurses correctly classified opiods, but were not aware that the relative potency of oral to intramuscular medication administration is four to one. Results of the second part of the survey showed that 41.6% of nurses believed there was a greater than 15% likelihood of addiction when treating patients with opiates. In a similar study McCaffery found that 28.2% of nurses believed that patients would become addicted when treated with opiates.

There is a difference between tolerance to pain medication and addiction to pain medication. Tolerance to pain medication results over a period of time and the patient needs increasingly larger doses of the drug to attain pain relief. Addiction is a compulsive behavior by a person who actively seeks narcotics for their psychic effects and not for

their therapeutic effects.

Sullivan (1994) suggests that inadequate education is a major reason for nurses' knowledge deficit in the area of pain management. Until nurses become more knowledgeable about pain assessment and management, patients will continue to experience moderate to severe pain despite recent advances in pain management . Sullivan suggests that as nurses become educated and more cognizant of pain issues, insights must be shared with the health-care team. In general, physicians have limited training in pain management. Many of the studies reviewed by Sullivan showed physicians' lack of knowledge and misconceptions about pain management.

In a study by Weiss, Sriwantanakul, Alloza, Weintraub and Lasagna (1983) 97 housestaff physicians, 142 nurses and 100 patients were surveyed regarding pain control. Questions for the survey were designed to elicit information on several aspects of the use of narcotic analgesics and analgesic care. Respondents were asked questions in regards to: the goal of postoperative analgesic treatment, their beliefs about using narcotic analgesics in combination with other drugs, fear of addiction, awareness of the placebo effect in analgesia, knowledge of analgesic drugs and confidence in prescribing and administering them, their opinion as to whether they thought patients generally received adequate treatment, undertreatment, or overtreatment with regard to pain. Fifty-seven questionnaires were returned by the housestaff (59% response) and 70 by the nurses (49% response). Forty-one percent of the physicians and 20% of the nurses believed that patients do not receive adequate analgesic treatment, 54% of physicians and 74% of nurses believed that analgesic treatment is adequate, and 5% of physicians and 6% of

nurses thought that patients are overtreated. Eighty one patients completed the survey (54 women and 27 men). At the point of lowest pain intensity over the 4 hour postmedication period, 5% continued to have severe pain, 36% had moderate pain, 42% had mild pain and 17% reported to have no pain.

Fear of addiction is also apparent in this study. Thirty nine percent of physicians and 48% of nurses answered that the chances were more than 15% that the patient would become an addict. Weiss (et al., 1983) concluded that most of the misconceptions about analgesic care among housestaff and nursing staff could be eliminated by effective teaching during their training programs, especially in the clinical years when they should be particularly receptive to education on the correct clinical use of drugs.

Conclusion

It is clear from the literature that the management of pain is not a simple task. Decisions to medicate a patient are influenced by personal bias, fear of addiction, lack of education in the administration of narcotics, and inadequate knowledge regarding the affects of pain on the organ systems of the body. When left untreated, pain will influence the optimal outcome of the patient.

All members of the health care team should recognize that trauma patients experience pain in an individualistic manner and personal bias or experience with pain should not influence the decision to administer pain medication or not. The Agency for Health Care Policy and Research supports this by stating pain control methods depend on cooperation between different members of the health care team throughout the patient's course of treatment (1992).

Theoretical Hypothesis

The Level 1 Trauma Center is more aggressive in administering pain medication to the acute adult trauma patient than non Level 1 Trauma Center emergency departments.

Research Question

What differences are there between the pain medication practices at the Level 1 Trauma Center versus the pain medication practices at a non Level 1 Trauma Center when providing care for the acute adult trauma patient? Specifically, this study compared the Level 1 Trauma Center and the non Level 1 Trauma Center emergency departments in relation to:

1. The length of time from admission to administration of the first pain medication
2. The length of time between administration of consecutive doses of pain medication
3. The type of pain medication administered
4. The dosage of pain medication administered

Definition of terms

In this study the following definitions were used. Level 1 Trauma Center is defined as a definitive care facility with personnel trained specifically in the treatment of trauma. Acute adult trauma patients were 17 years of age or greater that had sustained one or more injuries from a traumatic event. A non Level 1 Trauma Center emergency department was defined as an emergency department that had the capabilities of stabilizing

a patient but not the personnel or resources to provide specialty care for the patient.

CHAPTER 3

METHODOLOGY

Design

This study used a descriptive two group comparison research design. The study compared the time, route, type and quantity of pain medication administered in the first hour of care in the Level 1 Trauma Center to the first hour of care in a non Level 1 Trauma Center emergency department. Group one consisted of 74 patients admitted directly to the Level 1 Trauma Center and group two consisted of 65 patients that were treated at a non Level 1 Trauma Center emergency department and then transferred to the Level 1 Trauma Center.

Both groups involved trauma patients but compared pain medication administration in two different locations. This research design allowed the researcher to compare the two groups with respect to the length of time from admission to the time of initial pain medication administration, the quantity of medication administered, the time intervals between successive administrations of pain medication and the types of medication administered.

Patient records were reviewed to collect the data for this study. Care was taken to use data only from the first hour of patient care in the emergency department. A limitation of this study was the dependence on the quality of documentation by the health care

providers.

Sample

The patient population for this study was drawn from the Trauma Registry during the time frame of January 1, 1994 through December 31, 1995. Patients included in this study were 17 years of age or greater and had an Injury Severity Score (ISS) equal to or greater than 13 for blunt trauma and equal to or greater than 10 for penetrating trauma. These ISS scores are considered by this Level 1 Trauma Center to be the start point of patients classified as major trauma patients. The ISS can range from 1 to 75 with 1 being the best score. Patients in cardiopulmonary arrest, burn trauma patients, and those taken to the operating room within the first hour were excluded from this study. Patients in arrest were considered to be too hemodynamically unstable to receive pain medication, burn trauma patients were admitted directly to the Burn Unit and patients that rapidly entered the operating room had all of their medication needs managed by the anesthesia team. The period of time investigated was the first hour the patient was in the emergency department.

Patients qualified for this study according to their Injury Severity Score. The severity of injury sustained by the trauma patient was established using the ISS system developed by Baker, O'Neill, Haddon, and Long (1974). The ISS is an anatomic measure of injury severity based on the Abbreviated Injury Scale (AIS), a nonlinear scale for grading injury severity by organ, with increasing scores connoting increasing severity (Baker et al., 1974). The ISS combines the squares of the three highest AIS ratings for a patient's various injuries into a single score representing the overall severity of injury. It

can be applied to persons who have sustained injury to more than one area of the body as well as to those with isolated injuries.

Procedure

Data for the research study was obtained from the Trauma Registry and patient medical records. The trauma registry identified (a) patients who met the age criteria for the study, (b) whether patients were admitted directly to the Level 1 Trauma Center or were transferred from another emergency department, and (c) ISS score. Patient records and transfer records were used to collect the data for this research study. All patient medical records are property of the hospital and were reviewed in the medical records department of the hospital. Transfer records are kept by the Trauma Registrar and were also reviewed in the medical records department.

The content validity of the ISS was established by physicians specializing in trauma (Baker et al., 1974). Bull(1975), Moylan, Detmer, Rose and Schulz (1976), Semmlow and Cone (1976), and Stoner, Barton and Little (1977) studied the validity of the ISS and found that the ISS correlated with mortality rates of trauma patients. Mortality was found to be near zero for ISS values between one and 15. Reliability of the tool is based on the accuracy with which the AIS is obtained. Reliability of the ISS is established by interrater reliability which supports the equivalence aspect of reliability.

The Glasgow Coma Scale (GCS) is an internationally recognized tool for assessing the severity of head injury and degree of coma. The overall score ranges from 3-15 and is the sum of the best response in three subscales: eye opening, motor response, and verbal response. The total GCS score has been used as a descriptor to classify the severity of

head injuries, with a score of 13 to 15 defined as mild injury, a score of 9 to 12 as moderate, and a score of 8 or less as severe head injury and coma. The GSC score has enabled clinicians to more accurately predict the outcome of head injured patients (Cordona, Hurn, Mason, Scanlon, & Veise-Berry, 1994).

One hundred and thirty nine patients were included in this study. Group one consisted of 74 patients admitted directly to the Level 1 Trauma Center and group two consisted of 65 patients that were transferred from a non Level 1 Trauma Center emergency department to the Level I Trauma Center. The charts for each group were randomly selected from all of the candidates that fit the criteria for this study.

The data for this research was collected by the researcher in the medical records department at the hospital. A master list of all patients was used to identify all candidates for this study. This list consisted of identification numbers, ISS score and admission date to the hospital. From this information the patients were coded to prevent disclosure of patient information. This list was kept by the researcher while the data was being collected and destroyed upon completion of this study.

A tool was developed by the investigator to extrapolate specific information from the patient records that would be pertinent to this study. Information included patient demographics, mechanism of injury, GCS, type of injuries sustained, dose and type of pain medication administered, patient indicators of pain and level of consciousness (see appendix A). Patient names did not appear on the data collection tool to maintain patient confidentiality. The retrospective review of medical records posed no direct threat to the patients.

The data collection was specific to factual information. The tool preserved the anonymity physicians and nursing staff in all facilities. The information on this tool was reviewed and approved by the physicians in the Trauma and Emergency Center and the Trauma Surgery Service.

Protection of Human Rights

This research project reviewed patient records to obtain information for this study. Approval to conduct this study was obtained from the Human Subject Review Committee at Grand Valley State University and the hospital Institutional Review Board. There were no identified risks to the patients in this study as they had been discharged prior to the collection of this data.

CHAPTER 4

DATA ANALYSIS

The purpose of this research was to (a) identify the length of time from arrival to when the acute adult trauma patient received the first dose of pain medication, (b) identify the time interval between consecutive doses of pain medication, (c) identify the type of pain medication administered, and (d) identify the dosage of pain medication administered. Data analysis was accomplished utilizing the Statistical Package for Social Sciences (SPSS/PC+) software.

Subjects

Two groups of patients were compared: those admitted directly to the Level 1 Trauma Center (L1TC) and those admitted to non Level 1 Trauma Center emergency departments (nonL1TC). The Level 1 group consisted of 74 patients and the non Level 1 group consisted of 65 patients for a total of 139 patients. Males represented 66% (n=91) of the patients while females represented 34% (n=48). The ages ranged from 17-85 with a mean of 35 years (SD±18). This group is typical of trauma patients who are generally males between the ages of 17 and 45. A detectable blood alcohol level was present in 36% (n=50) of all patients. Table 1 presents the demographic data for the study as a whole and the individualized groups.

Table 1

Demographic data

	All Patients	L1TC n=75	nonL1TC n=65
Mean age	36	34	37
Male Female	91 (66%) 48 (34%)	48 (65%) 26 (35%)	43 (66%) 22 (34%)
Mean blood alcohol level	.18 (n=50)	.18 (n=30)	.20 (n=20)

Table 2

Mechanism of Injury

	Frequency (n)	Percentage (%)
Motor vehicle crash	103	74
Fall	8	6
Pedestrian struck	7	5
Penetrating	3	2
Assault	2	1
Other	16	12

Mechanism and Type of Injury

Injuries were most frequently sustained as the direct result of a motor vehicle crash (74%). Distribution of the mechanism of injury is illustrated in Table 2. The variable termed "other" included motorcycle, bicycle and moped crashes. The Injury of Severity Score ranged from 13-50 on a scale of 1-75 and Glasgow Coma Score from 3-15 for the whole group. Patients admitted directly to the Level 1 Trauma Center presented with higher ISS and lower GCS representing more seriously injured patients. Table 3 compares the ISS and GCS between the groups of patients.

Table 3

Mean Injury Severity and Glasgow Coma Scores

	ISS	Std Dev	GCS	Std Dev
Whole Group	21.6	±8.5	12.55	±3.7
L1TC	23.9	±9.5	11.5	±4.0
nonL1TC	19	±6.4	13.7	±2.9

Common injuries between all patients included traumatic brain injury (60%), rib fractures (28%), facial fractures (23%) and pelvic fractures (22%). Femur fractures were most prevalent in the non-Level 1 group (22%) in comparison to 14% for the trauma center while pulmonary contusion (20%), pneumothorax (24%) and radius/ulna fractures (22%) were seen most frequently in the patients that presented directly to the Level 1 Trauma Center (see table 4).

Indicators of Pain

Patients presented with varied levels of consciousness. Sixty-eight percent were conscious, 23% presented unconscious and 9% were combative. No distinction was made between the patient being unconscious as a result of the traumatic event or from chemical sedation given by pre-hospital providers. Physiologic indicators of pain included blood pressure, heart rate and respiratory rate. Tachycardia, hypertension and tachypnea alone or in any combination were included as physiological indicators of pain. Verbal indicators of pain were the direct responses from the patient. Forty-two (30%) patients presented with a verbal response to pain, 28 (20%) with both physiologic and verbal responses and 27 (19%) presented with physiological signs only. In 42 (30%) cases there was inadequate documentation to determine the type of response that may have been present. There were 19 patients who verbally complained of pain but were not medicated for pain. Ninety (65%) patients were not intubated and 49 (35%) patients were intubated. This study did not take into account when or where the patient was intubated or what medication was used for the procedure.

Pain Management

Pain was managed differently between the centers. At the non Level 1 centers, 31 of 65 patients were medicated for pain. Of these patients, 20% received morphine, 17% received ketorolac and 11% received meperidine by either intravenous or intramuscular route. In comparison, 52 of 74 patients at the Level 1 Trauma Center were given morphine only by the intravenous route. Morphine was administered in 2-10 mg increments, meperidine in 12.5 and 25 mg increments and ketorolac in 30 and 60 mg

Table 4
Distribution of injuries

Area of Injury	Whole Group	L1TC	nonL1TC
Brain Injury	83	51	32
Cervical Spine	19	9	10
Spinal Cord	11	8	3
Rib Fractures	39	21	18
Lung Contusion	23	15	8
Pneumothorax	24	18	6
Spleen	9	6	3
Liver	8	6	2
Kidney	5	3	2
Urinary Bladder	1	1	0
Facial Fracture	32	16	16
Dislocation	17	12	5
Humerus Fracture	10	4	6
Pelvic Fracture	30	17	13
Radius/Ulna	24	16	8
Tibia/Fibula	24	14	10
Femur Fracture	24	10	14
Other	90	54	36

increments. In the first hour of care patients received between 0 and 5 doses of pain medication. Table 5 presents how many patients received multiple doses of pain medication in the first hour.

Table 5

Number of doses patients received

	Zero doses	1 dose	2 doses	3 doses	4-5 doses
L1TC	22	52	32	12	5
nonL1TC	34	31	18	0	0

Patients treated at the Level 1 Trauma Center were significantly more likely to receive a narcotic for pain control (x^2=28.8, df=2, p=.04). An independent t-test indicated that patients treated at the Level 1 Trauma Center were more likely to receive significantly larger doses of pain medication (t=1.15, df=81, p=.04). To further verify this difference, the t-test was run a second time using computer randomization to make the number of patients in each group more equal in number. This also confirmed that the Level 1 Trauma Center patients were more likely to receive larger doses of pain medication. Group one was randomized to 29 patients and group two was randomized to 20 patients (t=2.05, df=47, p=.003).

Time from arrival to the administration of the first dose of medication was also found to be significantly different between the two groups (t=3.28, df=47, p=.003). Patients at the Level 1 Trauma Center were found to receive pain medication more quickly than those treated at a non level 1 Trauma Center emergency department. Table 6 shows the length of time from arrival in minutes to the administration of the first dose of pain

medication and the number of minutes between consecutive doses for the first hour in the emergency departments.

The analysis of this data indicates that patients treated at the Level 1 Trauma Center received pain medication more rapidly and only received narcotics by the intravenous route in comparison to patients at the non Level 1 Centers.

Table 6

Time interval between doses of pain medication

Time in minutes	Arrival to first dose	Second dose	Third dose	Fourth dose	Fifth dose
Whole group	19±43	20±14	17±13	11±6	1±1
L1TC	16±26	22±17	21±10	11±4	1±1
nonL1TC	23±15	16±11	9±6	n.a.	n.a.

CHAPTER 5

DISCUSSION AND IMPLICATIONS

The findings of this study supported the research hypothesis that the Level 1 Trauma Center administers pain medication more quickly and frequently to the acute adult trauma patient than the non Level 1 Trauma Center emergency departments. Patients were consistently given a narcotic for pain relief and the medication was administered by the intravenous route.

Recent literature suggests that pain control is becoming a major concern in providing care for critically ill and/or injured patients. This study indicated that the management of pain in the acute adult trauma patient is handled differently in a variety of centers. The pain practice at the non Level 1 centers varied widely and may be associated with the volume of trauma patients the emergency departments receive, experience level of the physician and nursing staff, and/or the understanding of the pharmacology of the medications chosen to be used. The administration of non steroidal anti-inflammatories, meperidine, and ketolorac may reflect the comfort level of the physician in prescribing pain medication. This study did not take into account the cultural background of the patient or health care provider, both of which may have influenced which medications would be administered. In contrast, the Level 1 center has a small, consistent team of experienced trauma surgeons and nurses who manage trauma patients on a daily basis. This level of expertise along with experience may afford the staff a higher comfort level when administering pain medication.

The route of administration also varied between the centers. In the non Level 1 centers meperidine was administered by both the intravenous and intramuscular route. It is not clear how well the administration of any medication given by the intramuscular route is absorbed in any type of traumatized patient, therefore, this route of administration should be avoided. It is also recommended that patients receive no more than 800 mg of meperidine in a twenty four hour period. The equivalent dose of meperidine to morphine is 100 mg to 10 mg. Patients in this study were given morphine in 2 mg to 10 mg doses and many received multiple doses in the first hour of care. Therefore, by administering only morphine, the patients do not "use up" their maximum dosage per 24 hour period. This provides the opportunity to continuously have the administration of pain medication titrated to their level of pain.

The length of time from arrival at the treatment center to the administration of pain medication also varied significantly between the types of centers. Thirty six patients at the Level 1 center received pain medication in the first 15 minutes in comparison to 15 patients at the non Level 1 centers. Possible differences between the types of centers may reflect the number of staff present to care for the patient, the availability of the medication, the length of time from the notice of patient arrival to actual arrival, and how the health care team prioritizes pain management. In some small emergency departments the sole nurse and physician comprise the whole health care team leaving no one to quickly obtain pain medications. When pain medication is administered, the dose and frequency should coincide with the signs and symptoms or complaints of pain from the patient. The quantity of medication should be based on patient response and not on age or body

weight. In the acute care setting, the health care team may find that patients will be more cooperative when they are medicated early for pain control and continue to receive medication as needed. Patients who receive medication early in their course of treatment may be found to recover more quickly and experience fewer complications. The early aggressive administration of pain medication to the acutely traumatized patient may be one of the first therapies to aid the patient in achieving an optimal outcome.

Relationship of Findings to the Conceptual Framework

According to the Neuman Systems Model, the flexible line of defense can be rapidly altered over a short period of time. Any traumatic event typically happens quickly and is usually unexpected, thus penetrating the flexible line of defense. Once the flexible line of defense has been penetrated, the patient is then dependent on alternate coping mechanisms that have been learned over time. When a patient is allowed to experience pain for any period of time, their ability to defend against the pain is broken down. Pain may become a controlling force, and the patient may start to focus all of their energy on defending/suppressing the pain and expend no energy in the area of healing the broken parts or storing nutrient supplies. It is these stressors that nursing must identify early and collaborate in implementation of an intervention.

Early on the acute trauma patient may verbalize that pain is present and request pain medication. When this request is ignored or the pain inadequately treated, the patient may demonstrate physiologic signs of pain. Increased blood pressure, dilated pupils, inability to focus or follow directions maybe some of the behaviors demonstrated by the patient. These stressors, if allowed to persist for a long period of time will erode the lines

of resistance that protect the core structure. For the acute trauma patient this may allow an infectious process to begin, impair respiratory drive, delay healing, or expedite single or multiple system organ failure.

According to the Neuman Systems Model early intervention may promote a positive outcome in dealing with the stressor. The implementation of early and continued pain medication administration allows the patient to store some of the core energy for healing and not expend it on pain control. This may also allow the patient to adapt and modify their behaviors which will strengthen their lines of resistance and allow the healing process to begin.

Relationship of Findings to Previous Research

Previous research addressed the issues of pain control once the trauma patient arrived to the critical care unit. This study looked at patients in the acute phase of resuscitation. No research was found that addressed this specific time frame. Data from this study supports the findings that some patients continue to not have their pain treated, the practice of pain medication administration varies from facility to facility, and the administration of pain medication is not always regarded as a primary or early intervention.

Limitations and Recommendations

This study did not take into consideration what medications the patient may have been given prior to arrival at the emergency department. In this regional referral area, patients transported by helicopter may have received narcotics and benzodiazapines throughout transport for sedation, pain control and/or airway management; and those

transported by ground units may have received narcotics. Pre-hospital records were not readily available or accessible; therefore, this information could not be included in the study. Medical personnel caring for these traumatized patients may have been told that the patient had received medication just prior to arrival to the emergency department and then elected not to administer additional medication. This may have influenced how rapidly a medication was administered after arrival. Recommendations for further research include: (a) look at pain medication administration in the pre-hospital environment, (b) set up a prospective study after delivering an educational session to physician and nursing personnel on pain management and then monitor the same emergency departments for changes in practice, (c) compare length of stay in patients who received pain medication early on to those who had delayed or no administration of pain medication.

Pre-hospital health care providers are in an optimal position to administer pain medications quickly to traumatically injured patients. In this region paramedics frequently do not address the issue of pain. A future study to be developed might include an education session on pain, implementation of a pain medication administration protocol, and then follow this prospectively to compare if the patients respond differently when medicated early for pain. A similar study directed at physicians and nursing personnel at the hospitals included in this study could identify if the practice of pain medication administration changed after attending an education session. Using current data, a third study to be developed could look at the outcome of patients who received medication early in comparison to those that received medication late or not at all during their initial

resuscitation. Specifically this study would look to see if there were differences in the patient outcomes.

Implications for Nursing

As the trend in health care progresses more toward managed care, outpatient treatment facilities, and high acuity inpatient centers with decreased length of stay, nurses have the prime opportunity to facilitate the achievement of these goals by advocating for the early administration of pain medications. In the acute care setting nurses at the bedside have the ability to continually assess the changing needs of the critically ill/injured patients and influence their plan of care. Nurses should place pain as a priority intervention and work with other members of the healthcare team in developing protocols for pain management. Prior to the placement of such protocols all members of the health care team should be reeducated to the signs and symptoms of pain, appropriate use of narcotics in the acutely ill/injured patient, preferred route of administration, and the difference between addiction and tolerance to narcotics.

Appendices

APPENDIX A

Data Collection Tool

Appendix A

Data Collection Tool

1. Patient ID _____

2. Type of Facility
____Level I Trauma Center (1)
____Outlying ED (2)

3. Age ____

4. Sex of patient
____male (1)
____female (2)

5. ISS ____

6. GCS____

7. ETOH
____no (0)
____yes (1)

8. Mechanism of Injury
____MVC (1)
____Pedestrian (2)
____Penetrating (3)
____Fall (4)
____Assault (5)
____Other (6)

9. TBI
____no (0)
____yes (1)

10. Rib fractures
____no (0)
____yes (1)

11. Liver injury
____no (0)
____yes (1)

12. Spleen injury
____no (0)
____yes (1)

13. Pelvic fracture
____no (0)
____yes (1)

14. Long bone fx
____no (0)
____yes (1)

15. Other injuries
_____no (0)
_____yes (1)

16. Pain med administered
____Morphine (1)
____Meperidine (2)
____Other (3)

17. Quantity dose one
_____

18. Quantity dose two
_____

19. Quantity dose three
____

20. Quantity dose four
_____

21. Quantity dose five
_____

22. Route Administered
____IV (1)
____IM (2)
____SQ (3)

23. Time from arrival to time of first dose
____

24. Time between dose 1-2
_____

25. Time between dose 2-3
____

26. Time between dose 3-4
____

27. Time between dose 4-5
_____

28. Number of doses given in first hour
____one (1)
____two (2)
____three (3)
____four (4)
____five or more (5)

29. State of consciousness
____conscious (1)
____unconscious (2)

30. Airway Status
____unintubated (1)
____intubated (2)

31. Patient c/o pain
____no (0)
____yes (1)

32. Signs of pain
_____physiologic only (1)
_____verbal only (2)
_____both physiologic & verbal (3)
_____not documented (4)

List of References

List of References

Acute Pain Management Guideline Panel: Acute Pain Management: Operative or Medical Procedures and Trauma, Clinical Practice Guideline. AHCPR Pub. No. 92-0032. US Department of Health and Human Services, Rockville, MD, 1992.

Baker, S. P., O'Neill, B., Haddon, W., Long W. B. (1974). The injury severity score: A method for describing patients with multiple injuries and evaluating emergency care. The Journal of Trauma 14, 187-196.

Ballard, L., (1981). Identification of environmental stressors for patients in a surgical intensive care unit. Issues in Mental Health Nursing, 3, 89-108.

Boisaubin, E. V. (1989). The assessment and treatment of pain in the emergency room. The Clinical Journal of Pain, 5(Suppl. 2): 19-25.

Bostrom, J., & Batina, M. (1994). Managing pain in a diverse medical-surgical patient population. Medsurg Nursing, 3, 469-474.

Bull, J. P. (1975). The injury severity score of road traffic casualties in relation to mortality, time of death, hospital treatment time and disability. Accident Analysis Prevention, 7,249-255.

Choiniere, M., Melzack, R., Girard, N., Rondeau, J., and Paquin, M. (1990). Comparisons between patients' and nurses' assessment of pain and medication efficacy in severe burn injuries. Pain, 40, 143-152.

Christoph, S. B. (1991). Pain assessment: the problem of pain in the critically ill patient. Critical Care Nursing Clinics of North America, 3(1), 11-17.

Cordona, V., Hurn, P., Mason, P., Scanlon, A., & Veise-Berry, S. (1994). Trauma nursing from resuscitation through rehabilitation (2nd ed.). Philadelphia: Saunders.

Cousins, M. (1984). Acute and postoperative pain. In P. D. Wall, & R., Melzack (Eds.), Textbook of Pain (pp. 284-305). Great Britain: University Printing House.

Gujol, M. C. (1994). A survey on pain assessment and management practices among critical care nurses. American Journal of Critical Care, 3, 123-128.

Hamilton, J., & Edgar, L. (1992). A survey examining nurses' knowledge of pain control. Journal of Pain and Symptom Management, 7(1), 18-26.

Kaiser, K. S. (1992). Assessment and management of pain in the critically ill trauma patient. Critical Care Nursing Quarterly, 15(2), 14-34.

Leisifer, D., (1990). Monitoring pain control and charting. Critical Care Clinics, 6, 283-293.

Mackersie, R. C., & Karagianes, T. G. (1990). Pain management following trauma and burns. Critical Care Clinics, 6, 433-449.

Marks, R. M., & Sachar, E. J. (1973). Undertreatment of medical inpatients with narcotic analgesics. Annals of Internal Medicine, 78, 173-181.

McCaffery, M. (1979). Nursing management of the patient in pain (2nd ed.). Philadelphia: J. B. Lippincott.

McCaffery, M., & Ferrell, B. (1991). How would you respond to these patients in

pain? Nursing, 21(6), 34-37.

McCaffery, M., & Ferrell, B. (1991). Patient age, does it affect your pain-control decisions? Nursing, 21(9), 44-48.

McCaffery, M., & Ferrell, B. (1992). How vital are vital signs? Nursing, 21,(1), 43-46.

McCaffery, M., & Ferrell, B. (1992). Does life-style affect your pain-control decisions? Nursing, 22,(4), 58-61.

Moylan, J. A., Detmer, D. E., Rose, J., & Schulz, R. (1976). Evaluation of the quality of hospital care for major trauma. Journal of Trauma, 16, 517-522.

Murray, M. J. (1990). Pain problems in the ICU. Critical Care Clinics, 6, 235-253.

Neuman, B. (1982). The Neuman Systems Model. Norwalk: Appleton-Century-Crofts.

O'Gara, P. T. (1988). The hemodynamic consequences of pain and its management. Journal of Intensive Care Medicine, 3, 3-5.

Semmlow, J. L., & Cone, R. (1976). Utility of the injury severity score: A confirmation. Health Services Research, 11, 45-52.

Silen, W. (1983). Cope's early diagnosis of the acute abdomen. New York: Oxford University Press.

Snyder, J. A. (1993). Evolution of trauma care. In J. A. Neff & P. S. Kidd. (Eds.). Trauma nursing: the art and science (pp. 3-20). St. Louis, MO: Mosby.

Stanik-Hutt, J. A. (1993). Strategies for pain management in traumatic thoracic

injuries. Critical Care Nursing Clinics of North America, 5, 713-721.

Stoner, H. B., Barton, R. N., & Little, R. A. (1977). Measuring the severity of injury. British Medicine Journal, 2, 1247-1249.

Sullivan, L. M. (1994). Factors influencing pain management: a nursing perspective. Journal of Post Anesthesia Nursing, 9(2), 83-90.

Watt-Watson, J. H. (1987). Nurse's knowledge of pain issues: a survey. Journal of Pain and Symptom Management, 2, 207-211.

Weiss, O. F., Sriwatanakul, K., Alloza, J. L., Weintraub, M., and Lasagna, L. (1983). Attitudes of patients, housestaff, and nurses toward postoperative analgesic care. Anesthesia Analog, 62, 70-74.

Wells, N. (1984). Responses to acute pain and the nursing implication. Journal of Advanced Nursing, 9(1), 51-58.