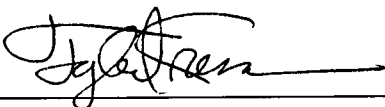


To the Graduate Council:

I am submitting herewith a thesis written by Wanda Gann entitled "An analysis of the most frequent employee injuries/illnesses reported by The University of Tennessee Campuses for the years 1991-1996." I have examined the final copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Safety Education and Service.


Susan M. Smith, Major Professor

We have read this thesis
and recommend its acceptance:





Accepted for the Council:


Associate Vice Chancellor and
Dean of The Graduate School

**AN ANALYSIS OF THE MOST FREQUENT EMPLOYEE INJURIES/ILLNESSES
REPORTED BY THE UNIVERSITY OF TENNESSEE CAMPUSES
FOR THE YEARS 1991-1996**

**A Thesis
Presented for the
Master of Science
Degree
The University of Tennessee, Knoxville**

**Wanda Lassiter Gann
December 1998**

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DEDICATION

This thesis is dedicated to my husband and sons

Michael Somers
Matthew Gann

and

Justin Gann

for their continual patience, encouragement, and support.

ACKNOWLEDGMENTS

Many people have had a part in my completion of this degree. I would like to thank Dr. Susan Smith, my advisor, for her unending patience, understanding, and support through this process.

I would like to express my appreciation to Greg Hyder, my data entry partner, who spent many hours helping me to get started with this project. Thanks also to many classmates, especially Nadine Bush, who shared experiences - both good and bad and delivered encouragement when things got tough.

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Lastly, I wish to thank my husband of three weeks, who has invested time, money, and encouragement in my pursuit of this degree. He has been a part of my life since I began work toward this degree and has been willing to help in whatever way possible. Without him I might never have reached my goal.

Abstract

The primary purpose of this study was to compile and analyze the injury/illness records and reports for The University of Tennessee employees for the 1991 through 1996 calendar years in order to determine the most frequent injuries or illnesses. The population consisted of employees of The University of Tennessee who reported recordable occupational accidents or injuries for the years 1991 through 1996. OSHA 200 log forms, prepared and submitted to OSHA by The University of Tennessee, accident report forms completed by the injured employee and his or her supervisor, and the Workers' Compensation Forms used to report lost workdays served as the major sources of data for this study. Selected information was gathered from these sources, entered into a spreadsheet format designed by the researcher, and analyzed using the Statistical Program for Social Sciences (SPSS).

The findings from this study show that the most frequent injuries/illnesses for The University of Tennessee system as a whole were sprains/strains, followed by contusion/avulsion, laceration, puncture, and other. Construction/maintenance was the job classification with the highest percentage of injuries/illnesses, followed by the nursing, housekeeping/custodian, clerical, and food service classifications. The most frequent event type was overexertion, followed by struck by, contact with, and slip/trip/fall (same elevation).

The findings from this study will allow management and those tasked with the safety of The University of Tennessee employees to take an informed and aggressive

approach in reducing the accidents and illnesses within The University of Tennessee employee population.

Based upon the findings of this study, workers in the following job classifications were more likely to experience an injury/illness: construction/maintenance, nursing, housekeeping/custodian, clerical, food service, or administration. It was also determined that although burns are not one of the top five injuries/illnesses overall, they rank number four for the food service job classification. Of the seven major campuses within The University of Tennessee system, the highest number of injuries/illnesses reported per 100 employees occurred at The University of Tennessee Memorial Hospital.

Due to the fact that sprain/strain was the top injury/illness for all sites and all job classifications analyzed, it is recommended that job analysis related to accident prevention be performed and that training be implemented in proper lifting techniques and other preventive work methods for all employees within The University of Tennessee system. It is also recommended that specific training be implemented in burn prevention for the food service workers and in proper lifting techniques and the prevention of puncture wounds for the nursing staff.

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CHAPTER I

INTRODUCTION

The analysis of previous injury/illness data can serve as an efficient and effective way to build future strategies to reduce accidents and illnesses and their associated costs. The study of accident reports can assist in the identification of unsafe conditions, needed employee training, effective intervention strategies, and can guide in the allocation of resources.

This study compiled the work-related injury/illness data from all 21 of The University of Tennessee campuses/locations for the 1991-1996 time period. The investigator sought to determine which were the five most frequently reported types of injuries/illnesses for The University of Tennessee system and if there was a significant difference between the types of injuries/illnesses reported by the entire University of Tennessee system. The study sought to determine if there was a significant difference between the types of injuries/illnesses reported by employees of The University of Tennessee system in different job categories and if there were differences, what those differences were. The study further sought to determine which of the event types were most frequently reported for the injuries/illnesses and if there was a significant difference between the five most frequently reported events associated with reported injuries/illnesses. The researcher also compared injuries/illnesses and further focused on each of the seven campuses employing an average of 800 or more employees for the years 1991-1996 to determine if there was a significant difference between the type of injuries/illnesses reported by these campuses. The study also sought to determine if a

significant difference existed between the frequency of reported injuries per 100 people employed at each of the seven largest campuses within The University of Tennessee system.

Statement of the Problem

The purpose of this study was to collect and report findings regarding work-related injuries and illnesses experienced by employees in The University of Tennessee system during the 1991-1996 time period. In addition to determining the frequency of injuries and illnesses for the system as a whole, this information was also used to determine significant differences in injuries/illnesses in different job classifications, investigate the five most frequently reported event types for the injuries/illnesses reported, look for significant differences in the types of injuries/illnesses reported by the seven major University of Tennessee campuses, and determine if there was a significant difference in the frequency of reported injuries/illnesses per 100 people employed at each of the seven major campus management locations.

The following research questions were developed to address the purpose of the study:

1. What are the five most frequently reported types of injuries/illnesses for The University of Tennessee system and is there a significant difference among the types of injuries/illnesses reported by the entire University of Tennessee system?
2. Is there a significant difference among the types of injuries/illnesses reported by employees of The University of Tennessee system in different job classifications? If so, what is the difference?

3. What are the five most frequently reported event types associated with injuries/illnesses reported by employees within The University of Tennessee system and is there a significant difference among the five most frequently reported event types?

4. Is there a significant difference between the expected number of injuries/illnesses and the actual number of injuries/illnesses reported by the major University of Tennessee campuses within The University of Tennessee system?

5. Is there a significant difference among the frequency of reported injuries/illnesses per 100 people employed at the seven largest campuses within The University of Tennessee system?

Need for the Study

The University of Tennessee employs individuals in many different job areas, leading to a wide variety of working conditions and related hazards. The results of this study can assist those in university management and tasked with the safety of The University of Tennessee employees have an accurate picture of the most frequently occurring hazards for the employee population as a whole and for the employee population at each individual University of Tennessee location. At the present time a detailed analysis of previously reported injuries/illnesses does not exist. Creating a detailed analysis will assist management in taking an informed and aggressive approach in reducing accidents and targeting future initiatives.

Injury/illness records are kept by The University of Tennessee as required by The Occupational Safety and Health Act (OSHA) of 1970. In addition to the OSHA log sheets (Appendix A-1), when an accident occurs, an accident report form (Appendix A-

2) is completed with different sections completed by the employee, to whom the injury/illness occurred, and the employee's immediate supervisor. Also, a Workers' Compensation Form is completed for work-related injuries or illnesses involving lost workdays.

Although The University of Tennessee maintains the OSHA records, accident reports, and Workers' Compensation Forms, little or no analysis of the data has previously been performed. Each campus or location sends their records to the Office of Risk Management at The University of Tennessee at the Central Administration Office in Knoxville. The Office of Risk Management prepares and submits the appropriate reports related to accidents and injuries and retains the records as paper copies, stored in boxes, with limited access. After a period of approximately seven years, the reports are discarded. Even though these reports contain a wealth of information regarding previous accident and illness causes and means of prevention, little or no analysis has previously been performed with the data. Without this retrospective analysis, the ability of the central office or each campus to rapidly produce a clear injury/illness profile is very limited. This profile is needed for the prevention of future accidents/illnesses. Some of the most useful information has not been easily or readily available to those charged with reducing workplace injuries and illnesses.

By identifying the five most frequently reported types of injuries/illnesses in The University of Tennessee system as a whole, the most frequently reported injuries/illnesses in different job classifications, the most frequently reported events associated with the injuries and illnesses, any significant differences between the types of injuries/illnesses

reported by seven of the largest University of Tennessee campuses and providing information on the frequency of reported injuries per 100 people employed at each of the seven largest campuses, this study attempted to provide findings that can be of use to The University of Tennessee and to others as they work to identify root causes of accidents, prioritize needs, and chart trends (McNeese & Balden-Anslyn, 1998, p.50). By more fully utilizing the accident information, unsafe conditions can be identified, employee training can be implemented, resources can be appropriately allocated, and various methods of intervention can help defray the costs of workplace injuries to The University of Tennessee. Findings from this study may assist university administrators in taking a more analytical approach to allocating future resources and building strategies to reduce the work-related injuries and illnesses within The University of Tennessee employee population.

Basic Assumptions

The following statements were assumed to be true for this study:

1. The information provided on the OSHA 200 log sheets (Appendix A-1), the accident reports (Appendix A-2), and the Workers' Compensation forms was accurate.
2. Tools used to collect the data (OSHA 200 logs, accident reports, and Workers' Compensation Forms) were valid and reliable.
3. Three teams of two individuals coded raw data from the OSHA 200 log sheets, Workers' Compensation Forms, and the accident reports. There may be inconsistency between the teams in choosing appropriate codes for the entries which were coded with numerical codes.

Delimitations

This research study included the following delimitations.

1. The study was restricted to employees of The University of Tennessee system.
2. The period for the data collection was delimited to the calendar years 1991-1996.
3. The study included only those employees of The University of Tennessee who experienced and reported an OSHA recordable injury or illness to supervision.

Limitations

This research study included the following limitations.

1. The accident records and reports were based on injuries/illnesses reported to supervision or medical personnel by the employees, which may differ from the actual number of injuries/illnesses which occurred.
2. Over the six-year period of data collection, some variation occurred in OSHA's criteria for recordable injuries/illnesses.
3. The OSHA 200 log sheets, Workers' Compensation Forms, and accident report forms used to collect the data were completed by a wide variety of people at multiple University of Tennessee campuses or locations.

Definition of Terms

“Incidence rates represent the number of injuries and illnesses per 100 full-time workers and were calculated as:

$(N/EH) \times 200,000$ where:

N = number of injuries and illnesses

EH = total hours worked by all employees during the calendar year

200,000 = base for 100 full-time equivalent workers working 40 hours per week, 50 weeks per year” (*Occupational Injuries and Illnesses*, 1997, p. 345).

Indemnity - compensation paid for lost worktime.

Lost workday cases - refers to instances involving days away from work, days of restricted work activity or both (*Occupational Injuries and Illnesses*, 1997, p. 6).

Lost worktime injuries - injuries which may be either lost workday cases or days-away-from-work cases (*Occupational Injuries and Illnesses*, 1997, p. 6).

Occupational Injury - “. . . one which results from a work-related event or from a single instantaneous exposure in the work environment” (*Occupational Injuries and Illnesses*, 1997, p. 5).

Recordable Injuries - injuries requiring medical treatment, injuries that involve loss of consciousness, injuries that require restriction of work or motion, or injuries that require a transfer to another job (*A Brief Guide*, 1986, p. 10-11).

CHAPTER II

REVIEW OF RELATED LITERATURE

Introduction

Absence due to work-related injury and illness is one of the major problems facing management today. The cost to the employer for disability-related injuries or illnesses, according to Wojcik (1998), is now an average of 8.3 percent of total payroll, or \$2,717 per employee. (p. 2). In *Workplace Injuries and Illnesses in 1996* (1997), it was reported that the Bureau of Labor statistics shows that approximately 2.8 million injuries and illnesses were characterized as lost workday cases in 1996. (p. 1). The medical costs of occupational injuries and illnesses surpass the costs of AIDS or Alzheimer's disease and are equal to the costs of cancer and all circulatory diseases (Herr, 1998, p. 83). The United States Bureau of Labor Statistics now estimates "that 9% of U.S. workers submit workers' compensation claims each year, and that the average lost-time case exceeds \$20,000" (Richardson and Larsen, 1997 p. 377). *National Occupational Research Agenda* (1996) states that in 1994, occupational injuries cost employers a total of \$121 billion (p. 445).

The cost to the organization of a work related injury or illness includes both direct costs and indirect costs. Direct costs such as medical treatment, lost work time, and replacement of equipment or material are more visible. But, indirect costs, although less visible, are very expensive too. Oxenburgh (1997) puts the indirect costs at 0.5 to 20 times the wage or salary cost (p. 151). Indirect costs include the time spent investigating the injury/illness and processing the claim, decreased product output, and the hiring and

training of replacement workers (Richardson and Larsen, 1997, p. 377). Miller (1997) emphasized that even overtime pay for other employees can be involved while they cover the injured employees' work. Or perhaps work will need to be rescheduled (p. 3). The effect on the morale of the other employees and their distraction from their work duties must also be considered when assessing the complications of work-related accidents.

In addition to the reported injuries, Weddle (1996) reports that those most likely to fail to report injuries or illnesses are older workers or those who have worked at the same job for a long time. Back injuries are the most often not reported injuries, with soft tissue injuries and sprains the next most unreported. Workers often refrain from reporting injuries or illnesses because they negate the importance of the injury or illness. Also, workers often fear that the supervisor might believe them to be careless. However, sixty-four percent of the unreported injuries required medical attention and 44.1 percent resulted in lost work time (Weddle, 1996, p. 222).

Herr (1998) quotes a report released in 1993 by the AFL-CIO Department of Occupational Safety and Health entitled *The Workplace: America's Forgotten Environment*. The report states, "The conclusion is inescapable. Public law and policy have created a much higher standard for protection of public health and the environment than for protection of America's workers. Environmental problems need and deserve a continued high level of attention. But the workplace has truly become a forgotten environment where fatalities, injuries, and disease are widespread, and government interventions limited" (p. 83). Hoskin states that unintentional injury is the fifth leading cause of death (p. 72). This is not to say that employers are not concerned for the

workers, but that many times the major focus of their attention is directed toward meeting laws and regulations, many of which are environmental and concern the public more than the employee population.

What approaches can management take in order to combat the problem? First, an idea of where the majority of the problems lie must be ascertained. Which job categories suffer the most injuries and illnesses and which injuries or illnesses are most prevalent? The answers to these and other similar questions can be answered through the analysis of accident/illness reports. This study has attempted to do that for The University of Tennessee.

The purpose of this study was to collect and report findings on information regarding occupational injuries and illnesses experienced by employees in The University of Tennessee system during the 1991-1996 time period. With this information, management can identify those employees at particular risk for injury/illness and take an informed and aggressive approach to reduce the rates and thus the costs of accidents and illnesses within The University of Tennessee system.

Studies Related to Injury/Illness Counts and Rates

The University of Tennessee encompasses many different job classifications and associated hazards, making it difficult to make a comparison to another type of industry. *Occupational Injuries and Illnesses* (1997) reports that in the U.S., manufacturing has the highest rate of injuries, but the service industries, such as hospitals and food service have the highest number of injury cases. Abraham, Weber, and Personick (1996) found that lesser skilled jobs have high risk of disabling injury and illness, partly because of

increased manual labor, heavy lifting, and higher turnover rates of the workers (p. 4).

There appears to be many service employees at The University of Tennessee, but very few with job classifications similar to that of manufacturing are expected to be found.

One fact pointed out in *Occupational Injuries and Illnesses* (1997) that was interesting and could be significant to The University of Tennessee is the fact that "in general, injury rates were higher for mid-size establishments (50 to 249 workers) than for small and large establishments" (p. 2). The University of Tennessee is not a mid-size establishment, but is divided into many different campuses or locations, some of which could fit the mid-size category and appear to be far removed in many ways from the main campus.

Expected Leading Injuries Overall

Slips, Trips, and Falls

As reported by Chiou, Bhattacharya, & Succop (1996), slips and falls are known to be a major source of injury in the workplace, causing lumbar spine injury, fracture of bones, and disability (p. 825). Silver (1994) reports that falls are the second leading cause of death in the U.S. and are the primary cause of death for people over the age of 79. Falls account for 10.4 percent of the 5,923 deaths that occurred in private industry in 1994 (Janicak, 1998, p. 35). Twenty percent of the disabling work-related injuries are also the result of falls (Silver, 1994, p. 36). An interesting fact noted by Silver (1994), is that there are far more injuries from falls on level surfaces, but the more serious injuries do occur from falls from elevated surfaces. Silver (1994) points out that although other injuries such as carpal tunnel syndrome get more attention, there are many more injuries

from slips and falls. In terms of costs, the healthcare costs due to falls total \$37 billion a year in the U.S., topped only by motor vehicle injuries, at \$49 billion (Silver, 1994, p. 37). Since falls can and do occur in virtually every occupation, one would expect The University of Tennessee to have experienced a great number of injuries from falls on every campus or location within the system.

Sprains, Strains, and Tears

Occupational Injuries and Illnesses (1997) reports that sprains, strains, and tears are "by far, the leading injury and illness category in every major industry division" (p. 3). Bruises, cuts, and fractures are reported to "make up a third to a half of the remaining cases (other than sprains and strains) in each major industry" (*Occupational Injuries and Illnesses*, 1997, p. 3). Since sprains, strains, and tears are often associated with overexertion, they might be expected to be more prevalent in labor type jobs. Bruises, cuts, and fractures most likely occur in every category.

Back Injuries

In a study of the workers' compensation claims for low back pain through Liberty Mutual Insurance Company in 1989, Webster and Snook (1994) reported that "low back pain cases represented 16% of all claims but 33% of all claims costs" (p. 1111). Webster and Snook (1994) further reported that the primary cost in workers' compensation claims was for indemnity. The cases that have prolonged disability are the major contributors to the cost of low back claims. According to the study by Webster and Snook (1994) "the mean cost per case for low back pain was \$8321; median cost per case was \$396" (p. 1111). The average workers' compensation claim for all injuries was \$4075, less than

half that for low back pain and the median of all workers' compensation claims was \$168, again less than half that for low back claims (Webster and Snook, 1994, p. 1113). But, Kornecki (1994) reports that the average compensation cost can go as high as \$25,000 for a back injury across all industries. According to Collins (1997), "Nearly three million people will file workers' compensation claims for repetitive stress injuries and back injuries this year to the tune of \$20 billion in direct costs to employers" (p. 146).

Nurses account for a great percentage of the back injuries. Turner (1996) reported that OSHA estimates that the fifth largest source of workers' compensation claims is for nurses with lower back injuries associated with patient handling. According to Hignett (1996) one in six nurses is likely to suffer from work-related back pain each year. Nurses miss almost 30 percent more days due to back pain than all other workers (Hignett, 1996, p. 172).

If The University of Tennessee is shown to have a high rate of back injuries, this area might need immediate attention. There are hospitals in The University of Tennessee system with nurses employed, but there are also other facilities employing workers with great potential for back injuries, including those in agriculture production positions. Many times training in proper lifting techniques can have immediate results and cut costs for this type of injury rapidly, by preventing new injuries.

Carpal Tunnel Syndrome and Repetitive Strain Injuries

Almost 64 percent of the work-related illness cases in 1996 were of the repetitive trauma type, such as carpal tunnel syndrome (Leonard, 1998, p. 10). Collins (1997) reports that carpal tunnel syndrome is an increasingly common complaint in office

settings and leads all causes of lost work days, totaling one month. This increase is explained by Richardson and Larsen (1997) as a result of the change of many office and white-collar jobs into jobs primarily associated with managing information. Previously, carpal tunnel syndrome and other repetitive strain injuries were primarily associated with assembly-line and blue-collar workers. Repetitive strain injuries (RSIs) have shown a dramatic increase with "three times the cases reported in the US in 1993 compared to 1986" (Yassi, 1997).

Repetitive strain injuries according to Yassi (1997), "consist of a variety of musculoskeletal disorders, generally related to tendons, muscles, or joints, as well as some common peripheral-nerve-entrapment and vascular syndromes" (p. 943). Yassi goes on to say that "these disorders generally affect the back, neck, and upper limbs, although lower limbs may also be involved (p. 943). Cohen (1997) defines repetitive strain injuries as "upper extremity injuries etiologically associated with repetition, position, force, temperature, or vibration" (p. 146). Occupational RSIs "result from repetitive and forceful motions, awkward postures, and other work-related conditions and ergonomic hazards" (Yassi, 1997, p. 943). Of course, repetitive strain injuries are most often thought to be associated with employees who spend a great amount of time entering data. However, this type of injury can occur in any individual performing duties that require repetitive motions, a lot of force, those working in temperature extremes, or those using equipment with a lot of vibration. With the variety of job categories in The University of Tennessee system, there are sure to be some repetitive strain injuries.

Frequency of Injuries Within Professions

Occupational Injuries and Illnesses (1997) reports that “wholesale and retail trade and services each accounted for approximately one-fourth of the injury cases in private industry” (p. 5) (Appendix B-3). A discussion will follow concerning injury/illness concerns for job classifications expected to be of concern to The University of Tennessee.

Nursing

As one would expect, McConnell (1998) reports that of all health care professionals, nurses suffer about 2/3 of the sharps injuries. And as reported earlier in this study, nurses suffer a high percentage of the reported back injuries (McConnell, 1998). Kornecki (1994) believes as other experts, that even with the high incidence of nurses reporting back injuries, only one-third of the back injuries occurring in health care facilities are actually reported (p. 57). Many nurses probably just accept back pain as an expectation of working in the nursing profession, especially with the cutback of personnel, leaving them often without help in lifting patients (Kornecki, 1994).

Bowman (1996) brought to light another problem not often recognized as a hazard of the health care professionals - that of the violent patient. Healthcare workers often have to deal with aggressive patients, some who abuse drugs or alcohol and others with dementia and Alzheimer's disease (p. 65). According to Bowman (1996) the risk of workplace violence is much greater for women than for men, with nursing and welfare work noted to be the most dangerous occupations for women. *Occupational Injuries* (1994) reported that women working in the health profession had a higher risk of

disabling injuries and illnesses than the average working woman. For men the risk is equal to that of other professions (*Occupational Injuries*, 1994, p. 61). Bowman (1996) found that women are employed in more service jobs and are often on the front lines.

Agriculture

Agricultural employees within The University of Tennessee's Agriculture Research and Extension Service fall into job categories that have been recognized for several years as being very hazardous. The major types of injuries in agriculture are sprains and strains, with nearly 40 percent of the sprains and strains involving the back and 25 percent of those due to overexertion. Very little work has been put into solving the ergonomic problems associated with agriculture (Meyers, Miles, Faucett, Janowitz, Tejeda, and Kabashima, 1997, p. 121). The main risk factors in agriculture are stooping, lifting and carrying loads, and repetitive hand tasks (Meyers, Miles, Faucett, Janowitz, Tejeda, and Kabashima, 1997, p. 125).

Food Service Workers

Although there are numerous injuries in the food-service area, the article from Dow Jones entitled *Industry Shows Signs of Improvement on a Slippery Issue*: Workplace Safety (1998) reports that "eating and drinking places had the lowest incidence rate for nonfatal injuries per 100 full-time or full-time-equivalent workers when compared with rates for all other industries reporting 100,000 or more injuries in 1996". This represents a fall in the incidence of nonfatal injuries from 7.4 per 100 full-time employees in 1995 to 6.1 per 100 full-time employees in 1996. The National Restaurant Association expresses the opinion that the drop in injuries is due to a proactive approach

taken through safety education and training for the employees (Industry Shows Signs of Improvement on a Slippery Issue: Workplace Safety, 1998, p. 2).

CHAPTER III

METHODOLOGY

Introduction

The analysis of previous accident/illness data can serve as an efficient and effective way to build future strategies to reduce accidents and illnesses and their associated costs. The study of accident reports can assist in the identification of unsafe conditions, needed employee training, effective intervention strategies, and can guide in the allocation of resources.

This study compiled the work-related injury/illness data from all 21 of The University of Tennessee campuses/locations (Appendix B-4) for the 1991-1996 time period. The investigator sought to determine which were the five most frequently reported types of injuries/illnesses (Appendix B-6) for The University of Tennessee system and if there was a significant difference between the types of injuries/illnesses reported by the entire University of Tennessee system. The study sought to determine if there was a significant difference between the number of injuries/illnesses reported by employees of The University of Tennessee system in different job categories (Appendix B-2) and if there were differences, what those differences were. The study further sought to determine which of the event types (Appendix B-8) were most frequently reported for the injuries/illnesses and if there was a significant difference among the five most frequently reported event codes. The researcher focused further on the campuses employing an average of 800 or more employees for the years 1991-1996 (Appendix B-1) to determine if there was a significant difference between the type of injuries/illnesses

reported by these larger campuses. The seven larger campuses include The University of Tennessee, Knoxville; The University of Tennessee at Chattanooga; The University of Tennessee at Martin; The University of Tennessee, Memphis; The University of Tennessee Agricultural Experiment Station; The University of Tennessee Agricultural Extension Service; and The University of Tennessee Memorial Hospital (Appendix B-1). And finally the study sought to determine if there was a significant difference between the frequency of reported injuries per 100 people employed at each of the seven largest campuses within The University of Tennessee system.

The data were collected from OSHA 200 log sheets (Appendix A-1), required by the Occupational Safety and Health Act of 1970 to be maintained as records of work-related injuries and illnesses; Workers' Compensation Forms, used to report work lost days; and accident reports (Appendix A-2), completed by the injured or ill employee and his/her supervisor. This chapter outlines the methods and procedures that were utilized to conduct this base line study of University of Tennessee employees' recordable injuries/illnesses for the calendar years 1991-1996.

Design

This study was a retrospective study, utilizing data that were previously recorded and maintained to meet OSHA requirements. Quantitative data were selected from OSHA 200 logs (Appendix A-1), accident reports (Appendix A-2), and Workers' Compensation Reports, completed by individual employees, their supervisors or staff in The University of Tennessee Office of Risk Management and were analyzed.

Most data entered into the spreadsheet (Appendix A-3) were numerical or yes/no data which were relatively objective. Entries coded by teams incorporated summaries of subjective descriptions.

This baseline retrospective study analyzed the number and type of injuries/illnesses reported by each category of employees (Appendix B-2), types of injuries/illnesses (Appendix B-6) and events (Appendix B-8). The independent variables involved in this study include the job category (Appendix B-2) of the individual and the campus location (Appendix B-4). The dependent variable is the specific injury or illness recorded.

The Study Population

The study population included the entire population of The University of Tennessee employees who experienced and reported OSHA recordable injuries or illnesses for 1991-1996. The data consisted of approximately 4670 injury or illness cases, but not necessarily that number of individuals. Some of the same subjects may have had multiple injuries or illnesses within the time period of the study.

The population consisted of employees from the twenty-one campus locations with recordable injuries/illnesses as part of The University of Tennessee system (Appendix B-4). The employee populations for The University of Tennessee campuses for the years 1991-1996 were averaged and the campuses with an average employee population of 800 or more were used for further analysis (Appendix B-1). These larger seven University of Tennessee campuses are University of Tennessee Knoxville, University of Tennessee at Chattanooga, University of Tennessee at Martin, University of

Tennessee Memphis, University of Tennessee Agricultural Experiment Station, University of Tennessee Agricultural Extension Service, and University of Tennessee Memorial Research Center.

For the purpose of this study the investigator organized the more than eleven hundred individual job classifications/titles used by The University of Tennessee into 24 job categories (Appendix B-2). Each employee report was coded in one of the following 24 job titles based on their job classification/title listed on the OSHA log (Appendix A-1) by the investigators. These 24 job categories were used to check for significant differences between the number of injuries/illnesses reported by employees of The University of Tennessee system in different job classifications. The construction/maintenance category includes maintenance, mechanic, AC/plumbing, insulators, sheet metal workers, welders, electricians, carpentry, and steam plant workers.

The number of recordable injuries/illnesses reported for 1991-1996 on the OSHA 200 logs ranged per year from 700 to 1200 recordable cases. The total number in the complete data file was 4670.

Instrumentation

The instruments used to collect the data were the OSHA 200 log forms (Appendix A-1), accident report forms (Appendix A-2), and the Workers' Compensation Forms used to report lost workdays. It should be noted that in some cases, parts of the reports were missing information. Proper and correct completion of the reports was dependent upon the injured or ill employees, their supervisors, and the staff of the UT Office of Risk Management who compile the OSHA 200 log sheets.

A spreadsheet (Appendix A-3) was designed by the researcher in Microsoft Excel to code and record the data from hard copies of the OSHA 200 log sheets (Appendix A-1), the Workers' Compensation Forms, and the accident reports (Appendix A-2). The spreadsheet was designed to incorporate information from the OSHA 200 log sheet, with much of the same layout to make data entry less confusing and more accurate (Appendix A-3 and Appendix B-5). The spreadsheet also provides space to code and/or categorize data. The spreadsheet was initially designed and tested with a small sample, then modified. The evaluation improved construct validity and enhanced efficiency of the entry process of entering 4670 entries.

A separate data file was created for each of the six years. The recorded cases were entered by three teams of two graduate students each into the spreadsheet and coded with numeric codes. Each file was converted from Excel to SPSS. Data were then merged into a combined data file including all data from 1991-1996. Analysis was performed using The Statistical Program for Social Sciences (SPSS). Careful consideration was taken in the coding of information and title entries in the spreadsheet so that all would be compatible with SPSS.

Management of Data

The documents and disks containing the recorded data were provided by The University of Tennessee Office of Risk Management and stored in a secured office on The University of Tennessee, Knoxville campus. The data were entered into a computer in the same secured office. After the data entry was completed, the records were returned to the risk management office on The University of Tennessee, Knoxville

campus. There were no names or identifying numbers, such as Social Security numbers, included in the merged file for the years 1991-1996. All information in the merged file was coded to numeric form. Descriptive data such as sentences describing the injury/illness were available in individual year data files, but only codes representing the type of injury/illness were imported into the merged file.

Data Collection

The narrative data were selected from official stored (hardcopy) records. This information was entered and coded in an SPSS data file to facilitate the statistical analysis. Possibility of variation in the entries included coding classifications, accident types, events and number of persons entering data. However, the time required for all the entries to be completed prohibited one person or even one team from entering all the data. Entries for many variables were coded allowing analysis with SPSS. Some coded variables included job titles (Appendix B-2), injury/illness types (Appendix B-6), injury/illness location (Appendix B-7), event surrounding the injury or illness (Appendix B-8), and yes and no entries. On the individual year spreadsheets, a written description of each injury or illness is also included, not for analysis, but for quick reference in case a question should arise (Appendix B-5).

The Injury/Illness Type Codes (Appendix B-6), Body Part Codes (Appendix B-7), and Event Codes (Appendix B-8) used were selected by a panel of experts after review of those used in other commercially available injury/illness databases and were thought out carefully based on those needed for the specific population and this projected analysis.

Data Analysis

The computations of the data were performed using SPSS 8.0 Statistical Program. Data analysis was based on frequencies and the Chi-Square test was performed on most analyses to show if there were significant differences.

In the analysis to determine the five most frequently reported types of injuries/illnesses for The University of Tennessee system as a whole, all the different injury/illness types (Appendix B-6) for the entire test population were tested for frequency. The five most frequently recorded injury/illness types were selected for analysis. This analysis excluded categories of less than 5 percent of the sample and those recorded in the "Other" category due to lack of specificity (Table 4-1).

To answer the question looking for a significant difference in the types of injuries/illnesses reported by employees in different job classifications (Appendix B-2), all job categories were first analyzed for frequency of injuries/illnesses (Table 4-2). Those job categories with a frequency of injuries/illnesses of more than 250 were selected for further analysis. Frequency tables for each job classification with 250 or more injuries/illnesses were created (Tables 4-3, 4-4, 4-5, 4-6, 4-7, and 4-8). Those injuries/illnesses demonstrating a 10 percent or greater number of the injuries/illnesses for each job classification were selected for further analysis using the Chi-Square test (Table 4-9).

A cross tabulation was run to give the actual count of particular injuries/illnesses in each of the job categories which had 250 or more injuries/illnesses (Table 4-9). This provided the expected count of particular injuries/illnesses, the percentage within the job

classification, and the adjusted residual. An adjusted residual of more than +2.0 is considered significant.

To determine the five most frequently reported event types (Appendix B-8) for injuries/illnesses reported by employees within The University of Tennessee system and if there is a significant difference among the five, the researcher selected the five with the highest occurrence from a frequency table of all event codes (Table 4-10). These five highest frequency event codes were chosen for the Chi-Square analysis.

For the analysis to determine if there was a significant difference between the type of injuries/illnesses reported by the major University of Tennessee campuses, the major campuses were defined as those with an average employee population of 800 or greater for the 1991 through 1996 calendar years (Appendix B-1). Frequencies were run for each of these campuses with more than 800 employees and all injury/illness categories (Appendix B-6) reporting 10 percent or a greater number of the total injuries/illnesses were used for further Chi-Square analysis (Tables 4-11 through 4-17). Of the 3186 injuries/illnesses selected from these campuses, a cross tabulation was performed so that the count of each injury/illness category for each campus, the expected count for each campus, the percentage of injuries/illnesses within each particular campus, and the adjusted residual could be shown (Appendix 4-18). An adjusted residual of greater than +2.0 is considered significant.

In using the Chi-Square test to determine differences in accident rates between campuses, the expected estimated value used by the Chi-Square was replaced by the

actual average number of individuals employed at each campus for the time period of 1991-1996 (Appendix 4-20).

Summary

The methodology used in the study has been outlined in this chapter. The population consisted of employees of The University of Tennessee who reported recordable occupational injuries or illnesses for the 1991 through 1996 calendar years. Selected information was gathered from OSHA 200 log sheets (Appendix A-1), Workers' Compensation Forms, and accident reports (Appendix A-2), entered into a spreadsheet format designed by the researcher (Appendix A-3), and analyzed using SPSS. Statistical analysis included frequencies and Chi-Square analysis with a significance level of .05.

CHAPTER IV

RESULTS

Analysis of Research Questions

In this section, questions related to injuries and illnesses for The University of Tennessee system were presented and analyzed. The research questions were presented and analyzed using the Pearson Chi-Square test and were tested at the .05 level of significance.

Five Most Frequently Reported Types of Injuries/Illnesses for The University of Tennessee System for the 1991-1996 Time Period

The five most frequent injuries/illnesses for The University of Tennessee system were sprain/strain, contusion/avulsion, laceration, puncture, and other. Because of the variety of injuries/illnesses the "Other" category could encompass, the injury/illness type "Other" was not included in the Chi-Square analysis. Chi-Square analysis was performed on the sprain/strain, contusion/avulsion, laceration, and puncture categories. Test statistics concluded that sprain/strain was the most frequent injury/illness for the entire population, making up 1962 (42 percent) of the total injuries/illnesses.

Contusion/avulsion (694, 14.9 percent) was second most frequent, laceration (637, 13.5 percent) was third most frequent and puncture (256, 5.5 percent) was fourth.

The Chi-Square Test, using a .05 level of significance, concluded that there was a significant difference between the types of injuries/illnesses reported by The University of Tennessee system. The actual significant difference for this test was less than .001,

reflecting the great margin observed in the frequency test of the injuries/illnesses. Table 4-1 provides the results.

Injuries/Illnesses in Different Job Classifications Within The University of Tennessee System for the 1991-1996 Time Period

There was a significant difference between the types of injuries/illnesses reported by employees of The University of Tennessee system in different job classifications. A cross tabulation was performed and the construction/maintenance job classification was shown to be the job classification with the highest frequency of injuries/illnesses with 952, 20.4 percent of the total for The University of Tennessee system for 1991-1996. The job classification with the second highest frequency was nursing with 749 injuries/illnesses, 16.0 percent of the total. The housekeeping/custodian job classification was third with 487 injuries/illnesses (10.4 percent), clerical workers were fourth with 470 injuries/illnesses (10.1 percent), food service was fifth with 388 injuries/illnesses (8.3 percent), and sixth was the administration job classification with 262 injuries/illnesses, 5.6 percent of the total for The University of Tennessee for the 1991-1996 time period. Table 4-2 provides the results of the cross tabulation.

From the cross tabulation of job classifications and associated frequencies, the job classifications with 250 or more injuries/illnesses were chosen for further analysis. Those classifications were construction/maintenance, nursing, housekeeping/custodian, clerical, food service, and administration. Frequency tables were run on these job categories to determine the most frequent injuries/illnesses within the particular job category for the 1991-1996 time period.

4-1. Frequency of Injuries/Illnesses for The University of Tennessee System

Injury/Illness	Frequency	Percent
Sprain/Strain	1962	42.1
Contusion/Avulsion	694	14.9
Laceration	631	13.5
Puncture	256	5.5
Other	247	5.3
Fracture	209	4.5
Foreign Body	177	3.8
Dermatitis	153	3.3
Burn	142	3.0
Inhalation	113	2.4
Carpal Tunnel	31	.7
Hernia/Rupture	14	.3
Multiple	10	.2
Concussion	7	.2
Amputation	5	.1
Hyperextension	5	.1
Asphyxia	4	.1
Electric Shock	1	.0
Hearing Loss	1	.0
Total	4662	100.0
Chi-Square=1870.240 df=3 Level of Significance=<.001		

Chi-Square is testing differences between the top four injuries/illnesses.

0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 885.8.

4-2. Injuries/Illnesses Within The University of Tennessee System 1991-1996

Job Classification	Frequency	Percent of Total
Construction/Maintenance	952	20.4
Nursing	749	16.0
Housekeeping/Custodian	487	10.4
Clerical	470	10.1
Food Service	388	8.3
Administration	262	5.6
Med-Tech	246	5.3
Agricultural	202	4.3
Graduate Assistant	148	3.2
Research	129	2.8
Faculty	120	2.6
Lab-Tech	112	2.4
Police/Security	83	1.8
Doctor-Med	60	1.3
Ag Extension	51	1.1
Computer	43	.9
Veterinarian	41	.9
Printing	28	.6
Laundry	26	.6
Physical Therapy	24	.5
Child Care	18	.4
Athletics	11	.2
Paint	10	.2
Pharmacy	6	.1
Total	4666	100.0

A total of 4 cells were missing or miscoded.

A. Construction/Maintenance

In the construction/maintenance job classification the highest percent of injuries/illnesses were sprains/strains with 381 injuries/illnesses, 40.1 percent of the total number. The second highest number of injuries/illnesses occurred in the laceration category with 158 injuries/illnesses, 16.6 percent of the total. Contusions/avulsions were third in frequency with a total of 136, 14.3 percent. See the results in Table 4-3.

B. Nursing

In the nursing job classification the highest percent of injuries/illnesses were sprains/strains with 410 injuries/illnesses, 54.8 percent of the total number. The second highest number of injuries/illnesses occurred in the puncture category with 100 injuries/illnesses, 13.4 percent of the total. Contusions/avulsions were third in frequency with a total of 95, 12.7 percent. See the results in Table 4-4.

C. Housekeeping/Custodian

In the housekeeping/custodian job classification the highest percent of injuries/illnesses were sprains/strains with 230 injuries/illnesses, 47.2 percent of the total number. The second highest number of injuries/illnesses occurred in the contusion/avulsion category with 78 injuries/illnesses, 16.0 percent of the total. See the results in Table 4-5.

D. Clerical

In the clerical job classification the highest percent of injuries/illnesses were sprains/strains with 205 injuries/illnesses, 43.7 percent of the total number. The second

4-3. Injuries/Illnesses Within the Construction/Maintenance Job Classification

Injury/Illness	Frequency	Percent
Sprain/Strain	381	40.1
Laceration	158	16.6
Contusion/Avulsion	136	14.3
Foreign Body	66	6.9
Other	38	4.0
Burn	37	3.9
Dermatitis	36	3.8
Fracture	36	3.8
Puncture	26	2.7
Inhalation	23	2.4
Hernia/Rupture	5	.5
Asphyxia	4	.4
Multiple	2	.2
Amputation	1	.1
Hyperextension	1	.1
Carpal Tunnel	1	.1
Total	951	100.0

A total of 1 cell was missing.

4.4 Injuries/Illnesses Within the Nursing Job Classification

Injury/Illness	Frequency	Percent
Sprain/Strain	410	54.8
Puncture	100	13.4
Contusion/Avulsion	95	12.7
Laceration	35	4.7
Other	33	4.4
Dermatitis	23	3.1
Fracture	17	2.3
Burn	11	1.5
Inhalation	10	1.3
Foreign Body	8	1.1
Concussion	2	.3
Hernia/Rupture	2	.3
Hyperextension	1	.1
Multiple	1	.1
Total	748	100.0

A total of 1 cell was missing.

4-5. Injuries/Illnesses Within the Housekeeping/Custodian Job Classification

Injury/Illness	Frequency	Percent
Sprain/Strain	230	47.2
Contusion/Avulsion	78	16.0
Laceration	44	9.0
Dermatitis	30	6.2
Other	23	4.7
Inhalation	21	4.3
Foreign Body	18	3.7
Fracture	16	3.3
Puncture	11	2.3
Burn	7	1.4
Carpal Tunnel	4	.8
Concussion	2	.4
Hernia/Rupture	2	.4
Hyperextension	1	.2
Total	487	100.0

A total of 0 cells were missing.

highest number of injuries/illnesses occurred in the contusion/avulsion category with 90 injuries/illnesses, 19.2 percent of the total. See the results in Table 4-6.

E. Food Service

In the food service job classification the highest percent of injuries/illnesses were sprains/strains with 129 injuries/illnesses, 33.2 percent of the total number. The second highest number of injuries/illnesses occurred in the laceration category with 102 injuries/illnesses, 26.3 percent of the total. Contusions/avulsions were third in frequency with a total of 74, 19.1 percent. Burns were fourth highest in frequency with a total number of 47 burns occurring in the food service job classification, 12.1 of the injuries/illnesses for this job classification in the 1991-1996 time period. See the results in Table 4-7.

F. Administration

In the administration job classification the highest percent of injuries/illnesses were sprains/strains with 104 injuries/illnesses, 40.0 percent of the total number. The second highest number of injuries/illnesses occurred in the contusion/avulsion category with 49 injuries/illnesses, 18.8 percent of the total. Lacerations were third in frequency with a total of 37, 14.2 percent. See the results in Table 4-8.

The five injury/illness categories which were in the top 10 percent in the frequency tables for the job classifications experiencing 250 or more injuries/illnesses were analyzed to see if any of these five injuries/illnesses were more common in one job category than in another. To achieve this analysis a job code/injury or illness code cross tabulation was performed. In this cross tabulation, for each job classification the count of

4-6. Injuries/Illnesses Within the Clerical Job Classification

Injury/Illness	Frequency	Percent
Sprain/Strain	205	43.7
Contusion/Avulsion	90	19.2
Laceration	43	9.2
Fracture	32	6.8
Other	28	6.0
Carpal/Tunnel	19	4.1
Inhalation	17	3.6
Foreign Body	10	2.1
Puncture	9	1.9
Dermatitis	7	1.5
Multiple	4	.9
Burn	3	.6
Concussion	1	.2
Hernia/Rupture	1	.2
Total	469	100.0

A total of 1 cell was missing.

4-7. Injuries/Illnesses Within the Food Service Job Classification

Injury/Illness	Frequency	Percent
Sprain/Strain	129	33.2
Laceration	102	26.3
Contusion/Avulsion	74	19.1
Burn	47	12.1
Fracture	15	3.9
Dermatitis	10	2.6
Other	5	1.3
Foreign Body	4	1.0
Puncture	2	.5
Total	388	100.0

A total of 0 cells were missing.

4-8. Injuries/Illnesses Within the Administration Job Classification

Injury/Illness	Frequency	Percent
Sprain/Strain	104	40.0
Contusion/Avulsion	49	18.8
Laceration	37	14.2
Fracture	18	6.9
Other	13	5.0
Burn	9	3.5
Inhalation	9	3.5
Foreign Body	5	1.9
Puncture	4	1.5
Dermatitis	3	1.2
Hernia/Rupture	3	1.2
Concussion	2	.8
Carpal Tunnel	2	.8
Amputation	1	.4
Multiple	1	.4
Total	260	100.0

A total of 2 cells were missing.

injuries/illnesses in each category was given along with the expected count, the percentage of the particular type of injury/illness within the jobcode, and the adjusted residual. An adjusted residual of more than +2.0 is considered significant.

The injuries/illnesses within the administration job classification were what was expected overall. Workers in the clerical job classification experienced more contusions than expected, with an adjusted residual of 3.1. The adjusted residual for lacerations in the construction/maintenance was 5.0, indicating a higher number of lacerations than expected. Food service workers experienced more lacerations than expected with an adjusted residual of 7.3 and more burns than expected with an expected residual of 9.0. The housekeeping/custodian employees experienced more sprains/strains than expected with an expected residual of 3.1. Nursing employees experienced more sprains/strains than expected with an adjusted residual of 4.9 and many more puncture wounds with an adjusted residual of 12.2.

There was a significant difference between the types of injuries/illnesses reported by employees of The University of Tennessee system in different job classifications at the .05 level of significance. The actual value was less than .001. Injury/illness categories with 10 percent or a greater number of injuries for each of the job categories having a total of 250 or more injuries/illnesses were included in this Chi-Square analysis. Table 4-9 provides the results of the cross tabulation and Chi-Square test.

4-9. Cross tabulation of Injury/Illness Codes and Job Codes

Job Code		Burn	Laceration	Puncture	Sprains/Strains	Contusion/Avulsion	Total
Administration	Count	9	37	4	104	49	203
	Expected Count	8.7	31.9	11.6	111.1	39.7	203.0
	% Within	4.4%	18.2%	2.0%	51.2%	24.1%	100.0%
	Jobcode Adjusted Residual	.1	1.0	-2.4	-1.0	1.7	
Clerical	Count	3	43	9	205	90	350
	Expected Count	15.0	55.0	20.0	191.5	68.5	350.0
	% Within	.9%	12.3%	2.6%	58.6%	25.7%	100.0%
	Jobcode Adjusted Residual	-3.4	-1.9	-2.7	1.6	3.1	
Construction/ Maintenance	Count	37	158	26	381	136	738
	Expected Count	31.6	116.0	42.1	403.9	144.5	738.0
	% Within	5.0%	21.4%	3.5%	51.6%	18.4%	100.0%
	Jobcode Adjusted Residual	1.2	5.0	-3.0	-2.0	-.9	
Food Service	Count	47	102	2	129	74	354
	Expected Count	15.1	55.6	20.2	193.7	69.3	354.0
	% Within	13.3	28.8%	.6%	36.4%	20.9%	100.0%
	Jobcode Adjusted Residual	% 9.0	7.3	-4.5	-7.4	.7	

Job Code		Burn	Laceration	Puncture	Sprains/Strains	Contusion/Avulsion	Total
Housekeeping/ Custodian	Count	7	44	11	230	78	370
	Expected Count	15.8	58.2	21.1	202.5	72.4	370.0
	% Within Jobcode Adjusted Residual	1.9% -2.4	11.9% -2.2	3.0% -2.4	62.2% 3.1	21.1% .8	100.0%
Nursing	Count	11	35	100	410	95	651
	Expected Count	27.8	102.3	37.1	356.3	127.5	651.0
	% Within Jobcode Adjusted Residual	1.7% -3.8	5.4% -8.3	15.4% 12.2	63.0% 4.9	14.6% -3.7	100.0%
Total	Count	114	419	152	1459	522	2666
	Expected Count	114.0	419.0	152.0	1459.0	522.0	2666.0
	% Within Jobcode	4.3%	15.7%	5.7%	54.7%	19.6%	100.0%
Chi-Square=397.132		df=20				Level of significance=<.0001	

0 cells (.0%) have expected count less than 5. The minimum expected count is 8.68.

Most Frequently Reported Event Types

The five most frequently reported event types for injuries/illnesses reported by employees within The University of Tennessee system and their percentages were overexertion 1272 (27.2 percent), struck by 713 (15.3 percent), contact with 702 (15 percent), slip/trip/fall (same elevation) 678 (14.5 percent), and bodily reaction 282 (6 percent). The Chi-Square test was performed on the highest five event codes and a significant difference was shown. The Chi-Square test results were Chi-Square = 1064, $df = 4$, and the level of significance was less than .001 using a .05 level of significance. See table 4-10 for the results.

Types of Injuries/Illnesses Reported by the Major University of Tennessee Campuses

There was a significant difference in the types of injuries/illnesses reported by the major University of Tennessee campuses. Frequency tables were performed for each of the major University of Tennessee campuses, defined as those with an average employee population of 800 or greater for the 1991 through 1996 calendar years.

A. The University of Tennessee, Knoxville

The types of injuries/illnesses making up 10% or more of the total injuries/illnesses for The University of Tennessee, Knoxville campus are sprain/strain with a frequency of 477 (35.9 percent), laceration with a frequency of 276 (20.8 percent), and contusion/avulsion with a frequency of 199 (15.0 percent). See table 4-11 for the results.

B. The University of Tennessee at Chattanooga

The types of injuries/illnesses making up 10% or more of the total injuries/illnesses for The University of Tennessee at Chattanooga campus are sprain/strain

4-10. Most Frequently Reported Event Types

Event Type	Frequency	Percent
Overexertion	1272	27.2
Struck By	713	15.3
Contact With	702	15.0
Slip/Trip/Fall (same elevation)	678	14.5
Bodily Reaction	282	6.0
Struck Against	257	5.5
Other	222	4.8
Caught In/On/Under/Between	219	4.7
Slip/Trip/Fall (elevation)	194	4.2
Overexposure	127	2.7
Total	4668	100.0
Chi-Square=1064.790 df=4 Level of significance=<.0001		

Chi-Square is testing differences between the top five event codes.

0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 638.2.

4-11. Injuries/Illnesses for The University of Tennessee, Knoxville 1991-1996

Injury/Illness	Frequency	Percent
Sprain/Strain	477	35.9
Laceration	276	20.8
Contusion/Avulsion	199	15.0
Fracture	74	5.6
Burn	67	5.0
Foreign Body	60	4.5
Other	59	4.4
Dermatitis	53	4.0
Inhalation	22	1.7
Puncture	20	1.5
Carpal Tunnel	7	.5
Hernia/Rupture	5	.4
Concussion	4	.3
Amputation	3	.2
Hyperextension	2	.2
Multiple	1	.1
Total	1329	100.0

0 cells were missing.

with a frequency of 102 (46.6 percent), contusion/avulsion with a frequency of 37 (16.9 percent), and laceration with a frequency of 23 (10.5 percent). See table 4-12 for the results.

C. The University of Tennessee at Martin

The types of injuries/illnesses making up 10% or more of the total injuries/illnesses for The University of Tennessee at Martin campus are sprain/strain with a frequency of 69 (31.4 percent), laceration with a frequency of 36 (16.4 percent), and contusion/avulsion with a frequency of 30 (13.6 percent). See table 4-13 for the results.

D. The University of Tennessee, Memphis

The types of injuries/illnesses making up 10% or more of the total injuries/illnesses for The University of Tennessee at Memphis are sprain/strain with a frequency of 174 (37.7 percent), contusion/avulsion with a frequency of 68 (14.7 percent), other with a frequency of 60 (13.0 percent) and laceration with a frequency of 46 (10.0 percent). See table 4-14 for the results.

E. The University of Tennessee Agricultural Experiment Station

The types of injuries/illnesses making up 10% or more of the total injuries/illnesses for The University of Tennessee Agricultural Experiment Station are sprain/strain with a frequency of 112 (36.7 percent), contusion/avulsion with a frequency of 54 (17.7 percent), and laceration with a frequency of 44 (14.4 percent). See table 4-15 for the results.

4-12. Injuries/Illnesses for The University of Tennessee at Chattanooga 1991-1996

Injury/Illness	Frequency	Percent
Sprain/Strain	102	46.6
Contusion/Avulsion	37	16.9
Laceration	23	10.5
Fracture	18	8.2
Foreign Body	11	5.0
Other	9	4.1
Burn	6	2.7
Puncture	5	2.3
Dermatitis	3	1.4
Multiple	3	1.4
Hyperextension	1	.5
Inhalation	1	.5
Total	219	100.0

0 cells were missing.

4-13. Injuries/Illnesses for The University of Tennessee at Martin 1991-1996

Injury/Illness	Frequency	Percent
Sprain/Strain	69	31.4
Laceration	36	16.4
Contusion/Avulsion	30	13.6
Inhalation	18	8.2
Fracture	15	6.8
Foreign Body	11	5.0
Other	11	5.0
Puncture	7	3.2
Carpal Tunnel	7	3.2
Burn	6	2.7
Dermatitis	6	2.7
Hernia/Rupture	2	.9
Amputation	1	.5
Concussion	1	.5
Total	220	100.0

0 cells were missing.

4-14. Accidents/Illnesses for The University of Tennessee, Memphis 1991-1996

Injury/Illness	Frequency	Percent
Sprain/Strain	174	37.7
Contusion/Avulsion	68	14.7
Other	60	13.0
Laceration	46	10.0
Inhalation	24	5.2
Fracture	19	4.1
Foreign Body	17	3.7
Puncture	17	3.7
Dermatitis	15	3.2
Burn	11	2.4
Carpal Tunnel	8	1.7
Hernia/Rupture	1	.2
Hyperextension	1	.2
Multiple	1	.2
Total	462	100.0

0 cells were missing.

4-15. Injuries/Illnesses for The University of Tennessee Agricultural Experiment Station 1991-1996

Injury/Illness	Frequency	Percent
Sprain/Strain	112	36.7
Contusion/Avulsion	54	17.7
Laceration	44	14.4
Foreign Body	27	8.9
Dermatitis	16	5.2
Fracture	16	5.2
Puncture	12	3.9
Other	8	2.6
Inhalation	7	2.3
Burn	4	1.3
Carpal Tunnel	2	.7
Electric Shock	1	.3
Hernia/Rupture	1	.3
Multiple	1	.3
Total	305	100.0

2 cells were missing.

F. The University of Tennessee Agricultural Extension Service

The types of injuries/illnesses making up 10% or more of the total injuries/illnesses for The University of Tennessee Agricultural Extension Service are sprain/strain with a frequency of 19 (36.5 percent), laceration with a frequency of 9 (17.3 percent), and contusion/avulsion with a frequency of 7 (13.5 percent). See table 4-16 for the results.

G. The University of Tennessee Memorial Hospital

The types of injuries/illnesses making up 10% or more of the total injuries/illnesses for The University of Tennessee Memorial Hospital are sprain/strain with a frequency of 803 (50.1 percent), contusion/avulsion with a frequency of 237 (14.8 percent), and puncture with a frequency of 160 (10.0 percent). See table 4-17 for the results.

A cross tabulation was performed with the major campuses and injury/illness codes to check for significant differences between the types of injuries/illnesses reported by the major University of Tennessee campuses. In this cross tabulation, for each campus the count of injuries/illnesses in each category was given along with the expected count, the percentage of the particular type of injury/illness within the campus, and the adjusted residual. An adjusted residual of more than +2.0 is considered significant.

The University of Tennessee, Knoxville had a greater than expected number of lacerations with an adjusted residual of 10.1. The injuries/illnesses at University of Tennessee at Chattanooga, The University of Tennessee at Martin, The University of Tennessee, Memphis, The University of Tennessee Agricultural Experiment Station, and

4-16. Injuries/Illnesses for The University of Tennessee Agricultural Extension Service 1991-1996

Injury/Illness	Frequency	Percent
Sprain/Strain	19	36.5
Laceration	9	17.3
Contusion/Avulsion	7	13.5
Other	4	7.7
Foreign Body	3	5.8
Carpal Tunnel	3	5.8
Puncture	2	3.8
Inhalation	2	3.8
Burn	1	1.9
Dermatitis	1	1.9
Fracture	1	1.9
Total	52	100.0

0 cells were missing.

4-17. Injuries/Illnesses for The University of Tennessee Memorial Hospital 1991-1996

Injury/Illness	Frequency	Percent
Sprain/Strain	803	50.1
Contusion/Avulsion	237	14.8
Puncture	160	10.0
Laceration	141	8.8
Other	60	3.7
Dermatitis	49	3.1
Fracture	47	2.9
Burn	37	2.3
Foreign Body	33	2.1
Inhalation	21	1.3
Asphyxia	4	.2
Hernia/Rupture	3	.2
Carpal Tunnel	3	.2
Multiple	2	.1
Amputation	1	.1
Concussion	1	.1
Hyperextension	1	.1
Total	1603	100.0

6 cells were missing.

The University of Tennessee Agricultural Extension Service were within expected ranges. The University of Tennessee Memorial Hospital experienced higher numbers of both sprains/strains and punctures than expected.

A significant difference was shown in the Pearson Chi-Square test. The results of the Pearson Chi-Square Test indicated a Chi-Square value of 217.885, the df was 18, and the level of significance was less than .001 using a .05 level of significance. See table 4-18 for the results of the cross tabulation and the Chi-Square test.

Reported Injuries/Illnesses per 100 Employees at the Seven Largest University of Tennessee Campuses

There was a significant difference between the frequency of reported injuries per 100 people employed at each of the seven largest campuses within The University of Tennessee system. The Pearson Chi-Square value for this analysis was 1568.724, the df was 6, and the p-value was less than .001 using a .05 level of significance. The University of Tennessee Memorial Hospital employees experienced the highest number, 1609 and percentage (38.3) of injuries/illnesses for the total number of employees. The University of Tennessee, Knoxville was second in number 1329 and percentage (31.7) for the total number of employees in The University of Tennessee system during the 1991-1996 time period. See table 4-19 for the results of the frequency report.

A campus injury/illness cross tabulation was performed to look for significant difference between the frequency of recorded injuries/illnesses per 100 people employed at the seven largest campuses within The University of Tennessee system. A significant difference was shown. In this cross tabulation, for each campus the count of employees

4-18. Campus Injury/Illness Code Cross Tabulation

Campus		Laceration	Puncture	Sprain/Strain	Contusion/Avulsion	Total
The University of Tennessee, Knoxville	Count	276	20	477	199	972
	Expected Count	175.4	68.0	535.7	192.8	972.0
	% Within Campus	28.4%	2.1%	49.1%	20.5%	100.0%
	Adjusted Residual	10.1	-7.2	-4.5	.6	
The University of Tennessee at Chattanooga	Count	23	5	102	37	167
	Expected Count	30.1	11.7	92.0	33.1	167.0
	% Within Campus	13.8%	3.0%	61.1%	22.2%	100.0%
	Adjusted Residual	-1.5	-2.1	1.6	.8	
The University of Tennessee at Martin	Count	36	7	69	30	142
	Expected Count	25.6	9.9	78.3	28.2	142.0
	% Within Campus	25.4%	4.9%	48.6%	21.1%	100.0%
	Adjusted Residual	2.3	-1.0	-1.6	.4	
The University of Tennessee, Memphis	Count	46	17	174	68	305
	Expected Count	55.0	21.3	168.1	60.5	305.0
	% Within Campus	15.1%	5.6%	57.0%	22.3%	100.0%
	Adjusted Residual	-1.4	-1.0	.7	1.1	
The University of Tennessee Agricultural Experiment Station	Count	44	12	112	54	222
	Expected Count	40.1	15.5	122.4	44.0	222.0
	% Within Campus	19.8%	5.4%	50.5%	24.3%	100.0%
	Adjusted Residual	.7	-1.0	-1.4	1.7	

Campus		Laceration	Puncture	Sprain/Strain	Contusion/Avulsion	Total
The University of Tennessee Agricultural Extension Service	Count	9	2	19	7	37
	Expected Count	6.7	2.6	20.4	7.3	37.0
	% Within Campus	24.3%	5.4%	51.4%	18.9%	100.0%
	Adjusted Residual	1.0	-.4	-1.4	-.1	
The University of Tennessee Memorial Hospital	Count	141	160	803	237	1341
	Expected Count	242.0	93.9	739.1	266.0	1341.0
	% Within Campus	10.5%	11.9%	59.9%	17.7%	100.0%
	Adjusted Residual	-9.4	9.3	4.6	-2.6	
Total	Count	575	223	1756	632	3186
	Expected Count	575.0	223.0	1756.0	632.0	3186.0
	% Within Campus	18.0%	7.0%	55.1%	19.8%	100.0%
Chi-Square=217.885		df=18		Level of significance=<.0001		

1 cells (3.6%) have expected count less than 5. The minimum expected count is 2.59.

4-19. Frequency of Reported Injuries/Illnesses for Employees at the Seven Largest Campuses Within The University of Tennessee System 1996-1996

Campus	Frequency	Percent
The University of Tennessee Memorial Hospital	1609	38.3
The University of Tennessee, Knoxville	1329	31.7
The University of Tennessee, Memphis	462	11.0
The University of Tennessee Agricultural Experiment Station	307	7.3
The University of Tennessee at Martin	220	5.2
The University of Tennessee at Chattanooga	219	5.2
The University of Tennessee Agricultural Extension Service	52	1.2
Total	4198	100.0

0 cells were missing.

not injured was given, the count of injured employees was given, and also a total of the employees for the campus was given. Along with the actual count was an expected count, the percent within the campus, and an adjusted residual. An adjusted residual of more than +2.0 is considered significant.

The adjusted residuals for injured employees were within the normal range for The University of Tennessee, Knoxville; The University of Tennessee at Chattanooga; The University of Tennessee at Martin; The University of Tennessee, Memphis; and The University of Tennessee Agricultural Extension Service. The University of Tennessee Agricultural Experiment Station had a high adjusted residual of 12.2 indicating a high rate of injuries/illnesses per 100 employees. The University of Tennessee Memorial Hospital had the highest adjusted residual of 35.9 indicating a very high rate of injuries/illnesses per 100 employees.

In using the Chi-Square test to determine differences in accident rates between campuses, the expected estimated value used by the Chi-Square was replaced by the actual average number of individuals employed at each campus for the time period of 1991-1996. The results are reported in table 4-20.

4-20. Cross tabulation of Campuses and Injuries/Illnesses

Campus		Not Injured	Injured	Total
The University of Tennessee, Knoxville	Count	52159	1329	53488
	Expected Count	51739.3	1748.7	53488.0
	% Within Campus	97.5%	2.5%	100.0%
	Adjusted Residual	13.4	-13.4	
The University of Tennessee at Chattanooga	Count	11506	219	11725
	Expected Count	11341.7	383.3	11725.0
	% Within Campus	98.1%	1.9%	100.0%
	Adjusted Residual	9.0	-9.0	
The University of Tennessee at Martin	Count	9629	220	9849
	Expected Count	9527.0	322.0	9849.0
	% Within Campus	97.8%	2.2%	100.0%
	Adjusted Residual	6.0	-6.0	
The University of Tennessee, Memphis	Count	20405	462	20867
	Expected Count	20184.8	682.2	20867.0
	% Within Campus	97.8%	2.2%	100.0%
	Adjusted Residual	9.4	-9.4	
The University of Tennessee Agricultural Experiment Station	Count	4551	307	4858
	Expected Count	4699.2	158.8	4858.0
	% Within Campus	93.7%	6.3%	100.0%
	Adjusted Residual	-12.2	12.2	
The University of Tennessee Agricultural Extension Service	Count	4989	52	5041
	Expected Count	4876.2	164.8	5041.0
	% Within Campus	99.0%	1.0%	100.0%
	Adjusted Residual	9.1	-9.1	
The University of Tennessee Memorial Hospital	Count	20969	1609	22578
	Expected Count	21839.9	738.1	22578.0
	% Within Campus	92.9%	7.1%	100.0%
	Adjusted Residual	-35.9	35.9	
Total	Count	124208	4198	128406
	Expected Count	124208.0	4198.0	128406.0
	% Within Campus	96.7%	3.3%	100.0%
Chi-Square=1568.724 df=6 Level of significance=<.0001				

0 cells (.0%) have expected count less than 5. The minimum expected count is 158.82.

CHAPTER V

FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

Findings

Based on the analyses of the data in the study of occupational injuries/illnesses within The University of Tennessee system for the 1991 through 1996 time period, the following findings were revealed. The findings were presented for The University of Tennessee system as a whole and then categorized according to job classification, event types, types of injuries/illnesses reported by the major campuses, and the frequency of reported injuries per 100 people employed at each of the seven largest campuses within The University of Tennessee system.

Five Most Frequently Reported Types of Injuries/Illnesses for The University of Tennessee System for 1991-1996

1. The most frequent injury/illness recorded within The University of Tennessee system was sprain/strain, making up 42 percent (1962) of the total reported injuries/illnesses.
2. Contusion/avulsion was the injury/illness category within The University of Tennessee system found to be second most frequent with a frequency of 694 (14.9 percent) of the total reported injuries/illnesses.
3. Laceration was found to be a close third most frequent injury/illness within The University of Tennessee system with a frequency of 631 (13.5 percent) of the total reported injuries/illnesses.

4. Puncture was found to be the fourth most frequent injury/illness within The University of Tennessee system, but was much less frequent than the other top injury/illness categories with only 256 (5.5 percent) of the total injuries/illnesses recorded being puncture wounds.

5. The fifth most frequent injury/illness classification within The University of Tennessee system was "Other" at 247 (5.3 percent) of the total. Because of the variety of injuries/illnesses "Other" could encompass, the injury/illness type "Other" was not included in the Chi-Square analysis.

6. The Pearson Chi-Square test that was run to check for a significant difference among the five most frequently reported injuries/illnesses recorded by the entire University of Tennessee system revealed significant difference.

Injuries/Illnesses in Different Job Classifications Within the University of Tennessee System for 1991-1996

1. Construction/Maintenance was the job classification with the highest frequency of injury/illness in The University of Tennessee system with a frequency of 952, 20.4 percent of the total.

2. Nursing had the second highest frequency of injuries/illnesses with 749, 16 percent of the total of the recorded injuries/illnesses for University of Tennessee employees in the 1991-1996 time period.

3. The housekeeping/custodian job classification was the third most frequent job classification for injuries/illnesses within The University of Tennessee system. The housekeeping/custodians' category had a frequency of 487, 10.4 percent of the total.

4. Clerical workers experienced the fourth highest frequency of injuries/illnesses within The University of Tennessee system with a frequency of 470, 10.1 percent of the total.

5. Fifth most frequent category of injuries/illnesses within The University of Tennessee system was the category of food service workers. The food service workers sustained 388, 8.3 percent of the total injuries/illnesses during the 1991-1996 time period.

6. When a Pearson Chi-Square test was run to check and see if there was any significant difference between the types of injuries/illnesses reported by employees of The University of Tennessee system in different job categories, there was shown to be a significant difference.

A. Administration

1. In the administration job classification within The University of Tennessee system, sprain/strain injuries were the most frequent, with a number of 104, 40 percent of the total injuries/illnesses within this job classification.

2. Contusion/avulsion was the second most frequent injury/illness category in the administration job classification within The University of Tennessee system with a frequency of 49, 18.8 percent of the total for the administration job classification.

3. The lowest injury/illness category in the administration job classification within The University of Tennessee system to fall above 10 percent in the frequency percentage was laceration. There were 37 lacerations recorded, 14.2 percent of the total injuries/illnesses for the administration job classification.

B. Clerical

1. The highest percentage of injuries/illnesses within the clerical classification within The University of Tennessee system was in the sprain/strain category with 205, 43.7 percent of the total injuries/illnesses within this job classification.

2. It was shown that the second most frequent injury/illness classification in the clerical category within The University of Tennessee system was contusion/avulsion with a frequency of 90, a percentage of 19.2 of the total for the clerical job classification. This was found to be higher than expected with an adjusted residual of 3.1.

C. Construction/Maintenance

1. In the construction/maintenance classification within The University of Tennessee system, sprain/strain injuries were most frequent at 381, 40.1 percent of the total injuries/illnesses within this job classification.

2. The second most frequent injury/illness classification in the construction/maintenance category within The University of Tennessee system was laceration with a frequency of 158, 16.6 percent of the total for the construction/maintenance job classification. This was found to be higher than expected with an adjusted residual of five.

3. The lowest injury/illness category in the construction/maintenance job classification within The University of Tennessee system to fall above 10 percent in the frequency percentage was contusion/avulsion. There were 136 contusions/avulsions recorded, 14.3 percent of the total for the construction/maintenance job classification.

D. Food Service

1. In the food service job classification within The University of Tennessee system, sprain/strain injuries were most frequent at 129, 33.2 percent of the total injuries/illnesses within the food service job classification.

2. The second most frequent injury/illness category in the food service job classification was laceration with a frequency of 102, 26.3 percent of the total for the food service job classification within The University of Tennessee system. This was found to be higher than expected with an adjusted residual of 7.3.

3. Contusion/avulsion was the third most frequent injury/illness category for food service workers within The University of Tennessee system. The frequency of contusions/avulsions was 74, 19.1 percent of the total for food service workers.

4. Burns were higher than expected with an adjusted residual of nine. It must be noted that the burn classification did not fall above 10 percent in any of the other job classifications. There were 47 burns recorded, 12.1 percent of the total for the food service job classification.

E. Housekeeping/Custodian

1. It was found that sprains/strains were the most frequent injuries/illnesses in the housekeeping/custodian job classification within The University of Tennessee system. The frequency rate for sprain/strains was 230, 47.2 percent for the housekeeping/custodian workers. This was found to be higher than expected with an adjusted residual of 3.1.

2. It was revealed that like in several of the other job classifications within The University of Tennessee system, contusion/avulsion was second most frequent at 78, 16 percent of the total for the housekeeping/custodial workers.

F. Nursing

1. Sprains/strains were higher than expected with an adjusted residual of 4.9. This represented 54.8 percent (410 in number), of the injuries/illnesses reported by the nursing staff within The University of Tennessee system.

2. The number of puncture wounds for the nursing employees within The University of Tennessee system was higher than expected with an adjusted residual of 12.2. There were 100 puncture type wounds reported, 13.4 percent.

3. Following closely as the third most frequent injury/illness category for the nursing employees within The University of Tennessee system was contusions/avulsions at 95, 12.7 percent.

4. It was revealed that the nursing staff experienced more punctures and sprain/strain injuries than was expected.

Most Frequently Reported Event Types for The University of Tennessee System

1. Of all the injuries/illnesses reported for The University of Tennessee system in the 1991 through 1996 time period, the most frequent event type was overexertion at 1272, 27.2 percent.

2. It was found that the second, third, and fourth most frequent event types for The University of Tennessee employees during the 1991-1996 time period were very

similar in percentage of frequency. The event types were: struck by at 713, 15.3 percent; contact with, at 702, 15.0 percent; and slip/trip/fall (same elevation) at 678, 14.5 percent.

3. A significant difference was found among the five most frequently reported event types associated with injuries/illnesses (overexertion, contact with, slip/trip/fall [same elevation], bodily reaction, and struck by) using a level of significance of .05.

Actual Count of Injuries/Illnesses Compared to Number Expected by the Major University of Tennessee Campuses

1. The frequency of lacerations for The University of Tennessee, Knoxville was found to be higher than expected.

2. It was discovered that the percentage of puncture wounds was much higher than expected and that the percentage of sprain/strain injuries was greater than expected at The University of Tennessee Memorial Hospital.

3. The result of the Pearson Chi-Square test checking for significant differences between the actual count of injuries/illnesses and the expected count of injuries/illnesses at different campuses revealed a high level of significance.

Frequency of Reported Injuries Per 100 People Employed at the Largest Campuses Within The University of Tennessee System

1. The University of Tennessee Memorial Hospital had the highest rate of injuries/illnesses per 100 people employed at the seven largest University of Tennessee campuses.

2. The University of Tennessee, Knoxville had the second largest percentage of injuries/illnesses at 31.7 percent of the total (1329 in number) for the seven largest campuses.

3. It was found that The University of Tennessee, Memphis was third in injuries/illnesses with 462, 11 percent of the total for the seven largest campuses.

4. Three hundred and seven, 7.3 percent of the injuries/illnesses for the seven major campuses, occurred at The University of Tennessee Agricultural Experiment Station.

5. The University of Tennessee at Martin and The University of Tennessee at Chattanooga were equal in percentages of injuries/illnesses for the seven major campuses with 5.2 percent each.

6. Lowest of the percentages of injuries/illnesses for the seven major University of Tennessee campuses was The University of Tennessee Agricultural Extension Service with only 52, 1.2 percent of the total.

7. It was found that of the seven major campuses only two experienced more injuries/illnesses than was expected. Those two campuses were The University of Tennessee Agricultural Experiment Station and The University of Tennessee Memorial Hospital.

8. The Pearson Chi-Square Test showed a significant difference between the frequency of reported injuries per 100 people employed at the seven largest campuses within The University of Tennessee system. The Pearson Chi-Square was applied with a .05 level of significance.

Conclusions

Based upon the findings of this study, the following conclusions were made.

1. Employees at The University of Tennessee are more likely to experience a sprain/strain, contusion/avulsion, laceration, or puncture than any other type of work-related injury or illness and employees working in job classifications of construction/maintenance, nursing, housekeeping/custodian, clerical, food service, and administration experienced the greatest number of recorded injuries/illnesses between 1991-1996. Each job classification exceeded an average of 250 injuries/illnesses per year.

2. While the top five job categories reporting the injuries include construction/maintenance, nursing, housekeeping/custodian, clerical, food service, and administration, the type of injury that occurred more frequently than expected was significantly different for each major job category. Employees within The University of Tennessee system in the nursing job classification reported a much higher than expected number of punctures and sprains/strains than expected. Food service workers in The University of Tennessee system had a much higher number of burns and lacerations than expected. University of Tennessee construction/maintenance employees had a higher than expected number of lacerations. Housekeeping/custodial workers for The University of Tennessee system reported a higher than expected number of sprains/strains. University of Tennessee clerical employees reported a higher than expected number of contusions/avulsions.

3. Of the ten events associated with injuries/illnesses at The University of Tennessee, employees are more likely to overexert themselves; be struck by an object;

come in contact with something harmful; slip, trip, or fall on a surface without elevation; or experience a bodily reaction to something harmful.

4. The University of Tennessee employees for the years 1991-1996 were more likely to experience a work-related injury or illness if they were employed at The University of Tennessee Memorial Hospital or The University of Tennessee Agricultural Experiment Station than those employed at the other University of Tennessee campuses.

Recommendations

Based upon the findings, conclusions, and literature review of the study, the following recommendations were made:

1. A study similar to this research should be conducted for other colleges and universities. Comparison could then be made to determine if the number of injuries/illnesses from The University of Tennessee system are higher or lower than those at other similar institutions.

2. Additional studies should be conducted to compare the injury/illness data of employees in various job classifications within The University of Tennessee system to employees with the same job classifications outside The University of Tennessee system in other public sector and private institutions.

3. Due to the fact that sprains/strains were the top injuries/illnesses for all sites and all job classifications analyzed, job analysis should be performed focusing on ergonomic issues and other preventive work methods for employees. Redesign of the task or change in the technique of performance should be evaluated as well as the ability of the workers to perform tasks. Control of which employees perform certain tasks

might be necessary. Training should also be implemented for all employees in proper lifting techniques.

4. Specialized job analysis, site evaluation, and training should be designed and implemented for each job classification experiencing 250 or more injuries/illnesses per year. This training should focus on the prevention of punctures and sprains/strains for the nursing profession; burn prevention and the prevention of lacerations for the food service workers; the prevention of lacerations for the construction/maintenance workers; the prevention of sprains/strains for the housekeeping/custodial workers; and the prevention of contusions/avulsions for the clerical employees.

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APPENDICES

APPENDIX A
FORMS USED AS SOURCE FOR DATA AND SAMPLE SPREADSHEET

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INJURIES

ILLNESSES

CH-4, Pgs. 2102

A-1. OSHA Log Sheet

NOTE: This form is required by Public Law 91-496 and must be kept in the establishment for 5 years. Failure to maintain and post can result in the issuance of citations and assessment of penalties. (See posting requirements on the other side of form.)	RECORDABLE CASES: You are required to record information about every occupational illness; every nonfatal occupational injury; and those nonfatal occupational injuries which involve one or more of the following: loss of consciousness, restriction of work or motion, transfer to another job, or medical treatment (other than first aid). (See definitions on the other side of form.)
---	--

OSHA No. 209



**ACCIDENT REPORT
STATE OF TENNESSEE
DIVISION OF CLAIMS ADMINISTRATION
9TH FLOOR ANDREW JACKSON BUILDING
NASHVILLE, TN 37219-6066
(615) 741-2734**

State Agency _____
Budget Code # _____
Location # _____

This form must be used exclusively by all state employees in presenting claims for workers' compensation. All questions must be answered.

TO BE COMPLETED BY EMPLOYEE: Social Security # _____ - _____ - _____

1. Employee's name _____
First M.I. Last
2. Birthdate _____ Sex _____ Job Title _____
Mo. Day Year
3. Home Address _____ City _____
State _____ Zip _____ Home Phone () _____
4. Supervisor _____ State Agency Univ. of TN Campus(
5. Office Address _____ City _____ Zip _____ Work Phone # _____
6. Date Employed by State _____
7. Exact location of project where injury occurred _____
County _____
8. Do duties of employee require being at this location? _____
9. Did employee leave work on day of injury? _____ If not, when did incapacity begin? _____
10. Date of Accident _____

DESCRIPTION OF THE INJURY:

1. State name of machine, tool, or other appliance with which injury occurred _____
2. Describe the injury in detail and state how it occurred _____

3. What part of person was injured? _____
4. Probable length of disability _____
5. Did employee lose time from work? _____ How much time? _____
6. Physician's name _____ Address _____
City _____ State _____ Zip _____ Phone # () _____
7. Date of first visit _____
8. Who authorized visit to physician? _____
9. Was employee hospitalized? _____ Where? _____

A-2. Accident Report Form

TO BE COMPLETED BY SUPERVISOR:

1. What position did employee hold when injured? _____
2. Was injury caused by (a) employee's willful misconduct? _____
(b) intentional self-inflicted injury? _____
(c) intoxication? _____
(d) failure or refusal to use safety appliance furnished him? _____
(e) failure to perform a duty required by law? _____
3. When was first notice of injury given to employer? Date _____ Time _____
To Whom? _____ Position _____
4. Monthly salary on date of injury \$ _____ Biweekly employee hourly rate _____
5. If disabled, will employee be on leave without pay during disability? _____
6. Relate any knowledge you may have of injury or what the employee reported to you _____

We, the undersigned, certify that all statements contained herein and on any attachments hereto are true and that the injuries reported were actually incurred. We also acknowledge that it is a misdemeanor to file a false claim with the Division of Claims Administration.

Claimant

Date

Supervisor

Date

TR-4231 (Rev. 2-94)

RDA 1178

[illegible]

OSHA Log Information

					(1) Injury Related Fatalities			Injuries with lost workdays			Nonfatal Injuries (0=No)	
(F) Injury/Illness Type	(F) Injury/Illness Code	(F-1) Body Part	(F) Body Part Code	Month	Day	Year	(2) Does injury involve days away from work, or days of restricted work activity, or both?	(3) Does injury involve days away from work?	(4) Enter number of days away from work.	(5) Enter number of days of restricted work activity.		

A-3. Spreadsheet (continued)

OSHA Log Information

1=Yes)	Type of Illness							Fatalities	Nonfatal I	
	(7a) Occupational Skin Disorders	(7b) Dust Diseases of the Lungs	(7c) Respiratory conditions due to toxic agents	(7d) Poisoning (systemic effects of toxic materials)	(7e) Disorders due to physical agents	(7f) Disorders associated with repeated trauma	(7g) All other occupational illnesses	(8) Illness Related - Enter Date of Death	(9) Does illness involve days away from work, or days of restricted work activity, or both?	(10) Does illness involve days away from work?
(6) Injuries without lost workdays. Was the injury recordable as defined above?										

A-3. Spreadsheet (continued)

OSHA Log Information

Injuries (0=No, 1=Yes)		Date of Birth		Date of Employment						
(1) Enter number of days away from work.	(12) Enter number of days of restricted work activity.	(13) Was the illness without lost workdays?	Month	Year	Month	Year	Worker's Comp. (0=No, 1=Yes)	Injury Cause or Event Description	Injury Cause or Event Code	Notes

APPENDIX B

UNIVERSITY OF TENNESSEE SPECIFIC AND CODED INFORMATION

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B-1. University of Tennessee Campus Employee Population

University of Tennessee Campus	1996	1995	1994	1993	1992	1991
University of Tennessee, Knoxville	10,214	8880	9058	8553	8417	8366
University of Tennessee at Chattanooga	2302	1942	1861	1784	1846	1990
University of Tennessee at Martin	1819	1668	1687	1688	1488	1499
University of Tennessee, Memphis	3551	3559	3604	3537	3335	3281
University of Tennessee Agricultural Experiment Station	863	858	809	776	778	774
University of Tennessee Agricultural Extension Service	875	825	843	863	831	804
University of Tennessee Memorial Hospital	3623	3731	3879	3701	3866	3778

B-2. Job Classification Codes

Job Category	Code	Job Category	Code
Administration	01	Housekeeping/Custodian	13
Agricultural Extension	02	Lab-Tech	14
Agricultural	03	Laundry	15
Athletics	04	Med-Tech	16
Child Care	05	Nursing	17
Clerical	06	Paint	18
Computer	07	Pharmacy	19
Construction/Maintenance	08	Physical Therapy	20
Doctor/Medical	09	Printing	21
Faculty	10	Research	22
Food Service	11	Veterinarian	23
Graduate Assistant	12	Police/Security	24

B-3. Eight Industries Reporting Largest Number of Workplace Injuries in 1994

Industry	Total Cases in Thousands
Eating and drinking places	356.6
Hospitals	311.7
Trucking and courier services	242.0
Grocery stores	228.0
Nursing and personal care facilities	217.2
Motor vehicles and equipment manufacturing	171.4
Department stores	171.4
Hotels and motels	124.8

B-4. University of Tennessee Campus Entity Codes

Campus	Entity Code
University of Tennessee, Knoxville	01
University of Tennessee Space Institute	02
University of Tennessee at Chattanooga	04
University of Tennessee at Martin	05
University of Tennessee, Memphis	07
Clinical Education Center, Knoxville	08
Clinical Education Center, Chattanooga	09
University of Tennessee Memorial Research Center	10
University of Tennessee Agricultural Experiment Station	11
University of Tennessee Agricultural Extension Service	12
University of Tennessee Institute for Public Service	13
University of Tennessee Municipal Technical Advisory Service	14
University of Tennessee County Technical Assistance Service	15
University of Tennessee Continuing Education	16
University-Wide Administration	17
University of Tennessee College of Veterinary Medicine	18
University of Tennessee Memorial Hospital	20
University of Tennessee Family Practice, Knoxville	21
University of Tennessee Family Practice, Jackson	23
University of Tennessee Family Practice, Memphis	24
William F. Bowld Hospital	25

B-5. Questions Answered on Spreadsheet

Question	Appropriate Answer
ID#	Year of report and row # in Excel (ie. 914)
Adjustments (X or nothing)	Adjustment to work loss days after initial entry - denoted by an X
Report - month and year	Date of OSHA report - entered numerically
Company Code	Same for all The University of Tennessee entries (ie. 1)
Injury - month, day, and year	Entered numerically
Employee's Name	From reports
Occupation	Narrative description on reports
Occupation Code	Numerical code (see Table 5)
Campus Code	3 digit numerical code from reports
Department Code	6 digit numerical code from reports
Injury/Illness Type	Narrative description on reports
Injury/Illness Code	Numerical code (see Table 7)
Body Part	Narrative description from reports
Body Part Code	Numerical code (see Table 8)
Fatalities	
Month, Day, and Year of Injury Related Fatality	Numerical entries
Nonfatal Injuries With Lost Workdays	
Does injury involve days away from work, or days of restricted work activity, or both?	0 = No 1 = Yes
Does injury involve days away from work, or days of restricted work activity, or both?	0 = No 1 = Yes

Question	Appropriate Answer
Does injury involve days away from work?	0 = No 1 = Yes
Enter number of days away from work.	Numerical entry
Enter number of days of restricted work activity.	Numerical entry
Injuries without lost workdays. Was the injury recordable?	0 = No 1 = Yes
Nonfatal Illnesses	
Occupational skin disorders	0 = No 1 = Yes
Dust diseases of the lungs	0 = No 1 = Yes
Respiratory conditions due to toxic agents	0 = No 1 = Yes
Poisoning (systemic effects of toxic materials)	0 = No 1 = Yes
Disorders due to physical agents	0 = No 1 = Yes
Disorders associated with repeated trauma	0 = No 1 = Yes
All other occupational illnesses	0 = No 1 = Yes
Fatalities - illness related	Enter date of death
Does illness involve days away from work, or days of restricted work activity, or both?	0 = No 1 = Yes
Does illness involve days away from work?	0 = No 1 = Yes
Enter number of days away from work.	Numerical entry
Enter number of days of restricted work activity.	Numerical entry

Question	Appropriate Answer
Was the illness without lost workdays?	0 = No 1 = Yes
Date of birth	Enter month and year numerically
Date of employment	Enter month and year employment began (numerically)
Workers' Compensation	0 = No 1 = Yes
Injury cause or event description	Narrative description
Injury cause or event code	Numerical code
Notes	Notes about case that could affect analysis

B-6. Injury/Illness Type Codes

Injury/Illness Type	Code	Injury/Illness Type	Code
Amputation	01	Hypertension	11
Asphyxia	02	Inhalation	18
Burn	03	Laceration	12
Concussion	04	Multiple	13
Dermatitis	05	Puncture	14
Electric Shock	06	Sprain/Strain	15
Foreign Body	07	Contusion/Avulsion	16
Fracture	08	Other	17
Hearing Loss	09	Carpal Tunnel	19
Hernia/Rupture	10		

B-7. Body Part Codes

Body Part	Code	Body Part	Code
Abdomen	30	Leg	41
Ankle	51	Multiple	42
Arm	31	Neck	43
Back	32	Nervous System	44
Chest	33	Respiratory System	50
Eye	34	Shoulder	45
Face	35	Thigh	46
Fingers	36	Toes	47
Foot	37	Trunk	48
Groin	38	Wrist	52

B-8. Event Codes

Event	Code	Event	Code
Bodily Reaction	01	Overexertion	06
Caught In/On/Under/ Between	02	Overexposure	07
Contact With	03	Struck Against	08
Slip/Trip/Fall (Elevation)	04	Struck By	09
Slip/Trip/Fall (Same Elevation)	05	Other	10

VITA

Wanda Lassiter Gann, daughter of Grady E. and Patricia Lassiter, was born in Oak Ridge, Tennessee on December 23, 1952. She is the oldest of five children and was raised in Harriman, Tennessee. She graduated with an Associate Degree in Dental Hygiene from East Tennessee State University in 1972. She worked as a Dental Hygienist until 1991 when she entered the Industrial Hygiene field. While working in the Industrial Hygiene Department for Lockheed Martin she obtained her Bachelors Degree in 1994 in Applied Organizational Management from Tusculum College. In 1996 she began work on her Master of Science Degree in Safety Education and Service at The University of Tennessee, Knoxville. Wanda has two children, Matthew Gann, who is an Electrical Engineer living in Huntsville, Alabama and Justin Gann who is a student at The University of Tennessee, Knoxville. She was married in October 1998 to Michael T. Somers.