POOR BEDS AND SLEEP ENVIROMENT AT FIRE HOUSES, AS RELATED TO SLEEP DISORDERS, LOSS OF SLEEP, AND SLEEP DEPRIVATION AS RELATED TO FIRE FIGHTERS PSYCHOLOGICAL AND PHYSICAL WELL BEING

E.M.U. SCHOOL OF FIRE STAFF AND COMMAND

Captain Thomas Mosteiko
Detroit Fire Department
Detroit, Michigan

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ABSTRACT

This research attempted to find a correlation between poor beds and their relationship to back problems/pain. The first problem is that the only standard in the mattress industry is size of the beds. There are also no standards for bed frames, or how long they should last. The only Federal standards are for fire retardation of the mattress material, or industrial use like hospitals, old folks and nursing homes. Some states and cities have laws about what a manufacturer can put inside a new mattress.

What I did find out was, what the industry [the Better Sleep Council] uses as recommendations for new mattress, and foundations. We will also go over how many hours of sleep a person should get a night, and what happens to you when you don't get it. What happens to you when you have sleep loss, or sleep deprivation? What are the consequences of sleep loss on work performance? These are a few of the detrimental side affects of sleep loss: mood shifts including depression, increased irritability, loss of sense of humor, stress, anxiety, loss of coping skills, difficulty concentrating, reduced commutation skills, reduction of the command decisions process, reduced ability to think logically and critically, reduced ability to assimilate and analyze new information, difficulties in solving problems, increased reaction time and the increased possibility of being injured or be in an accident.

This research supports the thesis that high quality sleep and a high quality sleep environment will improve the efficiency and over all well-being of the fire fighters. With these new self-imposed standards, it will make for a safer, less fatiguing environment to work in. This will also help to avoid accidents and on site work injuries and/or fatalities.

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INTRODUCTION

With it's usual indifference, the City of Detroit has purchased inferior mattresses and box springs/foundations, for use in the firehouses. This miss-match of different brands of mattress with different brands/makes of box spring gets put on top of bed frames that are over 30 years old. The bed frames have a tubular metal head and foot board section, the side rails are two metal tubes that hold the head board to the foot board, in-between this is a rectangle made of angle iron with steel wires and springs running across it. These bed frames have out lasted their useful life span, the side rails no longer hold the unit together property, the wires and springs have stretched and lost their supportability. The specifications of these units have diminishes over the many years of heavy continual usage. So that today they no longer satisfy or meet their designed function.

There is no mandate to replace old, worn out, or sagging mattresses, foundations and bed frames (which in some cases must be propped up to keep from sagging) for use by Detroit's firefighters. In past years, sometimes the Fire Department would replace 20 mattresses a year, most of the time the box springs were not replaced with them. Every day the basic manpower requires 302 beds in use. With 302 beds if you replace 20 beds a year, the replacement cycle would 15 years. Big name mattress manufacturers only guarantee it's best bed sets for 10 years. Because firefighters routinely sleep in cycles the quality of sleep is very important. With beds that sag in the middle because their insides have compressed, collapsed and lost it's support, these can be an irritating to the soft tissue of the spine; mattress that do not properly support the body may make it difficult to get restful nights sleep. The environment where one's sleep takes place, is also a factor in quality sleep (sleep hygiene**).**

Besides the beds, some of the main reasons for sleeplessness are: stress, anxiety, worrying, and pain. Backaches are the number one common pain symptom that accompanied sleeplessness. Firefighters work a 24-hour day, and because they are on duty for that 24-hour period, firefighters sleep at work. Sleep at the firehouse is very different than the sleep that one gets when they are at home. Firefighters seldom get that deep restful sleep (that they do, with a better sleep hygiene at their home, in their own bed), with the anticipation of a fire alarm at any moment, and having to get up and go to work.

When the fire alarm goes off at the firehouse, all the lights come on, and bells sound off, everyone gets up. If both of the fire apparatus don't go on the fire call, or when both fire apparatus return from the emergency call, the men now have wash up, replenish the water in the fire truck, do the fire report and other paper work, before trying to get back to sleep. It is a proven fact that when the alert system is activated (the bells go off, the lights go on, the emergency, the firefighters bodies have just had a jolt to their nerves system, the cardiovascular system, the brain has gone into high alert (fight or flight), the adrenaline, heart rate and respiration is elevated. These symptoms don't start decreasing for about one and a half to two minutes, that's about the time one sees smoke and/or flames, and everything peaks again. After the second peak, there is a confirmed fire; firefighters normally take about one hour to bring these rates down again. With all this, firefighters now have to try to sleep.

There are studies that state when one wakes up in the middle of the night and the lights are on, that the pineal gland in the brain stops making Melatonin, which helps people get to sleep. Once the pineal gland stops making Melatonin, it won't start up again until the next sleep cycle. The decision processes are always critical in the fire service. Fire service by its nature is an emergency service, which most often responds to crises situations. This is unlike a line worker in the private sector, where the work is repetitive and mundane. Personnel that respond

to these situations are required to make difficult decisions, quickly and efficiently, to minimize the loss of life and property. Any impediment to the effective decision making process in a crucial situation should be examined and removed. Poor sleeping conditions, that I will show, are in fact a hindrance/obstacle that affect critical decision-making.

There are many consequences of sleep loss and sleep deprivation on work/job performance. Some of the consequences are: stress, poor concentration, involuntary dozing, fatigue, depression, mircosleeps, mood shifts, loss of sense of humor, loss of coping skills, weight gain, feeling of being chilled, feeling of lethargy, not wanting to socialize with others, anxiety, and performance decrements. The impact on job performance is significant, along with emotional, psychological, and physical responses. There is also an increased probability that there will be more injuries at the firehouse, responding to a fire call, and at the emergency scene.

BACKGROUND and SIGNIFICANCE

After over 30 years in the Detroit Fire Department, I have worked and slept in every firehouse in the city. In this process, I have witnessed the many different mattresses, box springs and frames that the city has provided for the firefighters. Most of the bed frames that are still being used today are the same ones that were being used 30 years ago, and they were old then. Today, as in the past, the firefighters have had to come up with ways to support these frames, and keep them from sagging. The most popular idea is to place whole toilet paper rolls in-between the two lower horizontal support bars that run the length of the bed frame on both sides. I have seen as many as four rolls on many bed frames. The firefighters also have put large pieces of plywood between the box spring and the mattress. This is done to try to keep the bed from sagging too badly. Currently a lot of the beds sag so badly that one can easily see a 3 to 4 inch

dip in the middle of the mattress. This current setup is made up of newer mattresses (1 to 2 years old) that are one or two grades below what colleges put in their dorms, which are then put on top of same the old box springs (usually six to twelve years old, or more), and finally supported on top of the same old bed frames. Needless to say, it can be very difficult not only to get the support that is needed for the firefighters bodies, but also to get a quality, restful sleep.

"Sleep, a natural state of rest is characterized by reduced body movement and decreased awareness of the surrounding. Sleep is distinguished from other sleeplike states, for instance, hibernation or coma, because it is easily interrupted by external stimulation, such as loud noise"(Siegal, J.M.). Researchers don't know why we sleep; we know that it lowers the temperature of the brain, and that one's metabolism is lower when asleep. Some think that the function of sleep is the consolidation of memories, and " taking out the trash," "forgetting," to deprogram things that are not going into long-term memory, even to free up synapes for new learning. Researchers also think that the body heals itself while we sleep. "Sleep is actually an elaborate, active physiological state. It's not a passive activity; your brain has mechanisms that drive you to sleep. At least one of the things that take place during sleep is an active housecleaning by your immune system at the beginning of the night. The immune system has to be turned off at the end of the night to prevent the immune system from becoming too active" (Saul Rothenberg PhD). There are some that speculate that every night sleep rebuilds, metaphorically at least, cognitive and emotional capabilities. Michael Thorpy, MD states that "we're starting to learn about how lack of rest and sleep affects our metabolism. We know it disrupts normal patterns of hormones and biochemical changes in the body. So sleep has an important role in regulating our chemistry, keeping us alert during the day". Just as scientists have uncovered a network of pathways in the brain, along the brain stem, that stimulates the forebrain that causes it to remain awake. These pathways consist of nerve cells that

communicate using as neurotransmitters a group of chemicals, called monamines and acetylcholine. The monoamines include norepinephrine, dopamine, serotonin and histamine. These chemicals send messages to the forebrain through long branches, also called axons, from the brain stem. These messages provide arousing input to the cerebral cortex, which is the highest level of the nervous system, and the region most closely associated with thought (why we sleep). Just as these chemicals and mechanics stimulate the brain to keep the body awake, other chemicals inside the brain help us to sleep. "The suppressive effect of light on the synthesis and secretion of melatonin from the pineal gland is well documented. The mechanisms of light suppression involve retinal photopigment activation, inhibition of the electrical activity of the biological clock (the suprachiasmatic nuclei or SCN) and reduced neural activity in the cephalic division of the peripheral sympathetic nervous system. This leads to the diminished release of norepinephine from postganglionic neurons that end in the vicinity of the melatonin-producing cells in the pineal gland. As a consequence, the enzymes that mediate darkness-induced stimulation of melatonin production are shut down and the levels of melatonin in the blood are diminished. Imposition of light, when sufficiently intense and of proper wavelength, during darkness even if for a very short duration, suppresses the production of melatonin. Thus, the loss of melatonin due to light exposure may contribute to free radical-induced mitochondrial damage, reduced APT production, and organ deterioration. Light exposure during the normal dark periods inhibits melatonin production, and may well stop it production altogether until the next sleep cycle (Russel J. Reiter PhD.).

So if sleep is so essential for waking, then how much sleep is needed and for how long? Although the duration of sleep needed for stable waking functions varies among individuals and across the life span, daily sleep in our species is an average duration of eight hours. Far too many people are sleep-deprived to the point of requiring caffeine, exogenous stimulation and

compensatory effort to remain awake. There is evidence that the endogenous circadian pacemaker located in the superachiasmatic nucleus is a wake-promoting system (Edger, 1993). Its primary neurobiological effect is to promote wakefulness at the right time of day. In diurnal animals like us, that's when the sun is out. The sleep drive or so-called "sleep homeostat" is in counter regulation to these waking mechanisms. The longer that you're awake, or the less sleep you get night after night, the greater the drive to sleep. In reality, the circadian pacemaker and sleep homeostat interact dynamically, tipping the balance toward sleep at night and waking during the day. Even though your circadian system may be promoting wakefulness at the right time of day, if you have too great a sleep debt, your ability to function will be compromised. You will experience problem sleepiness, with its attendant risk for reduction in attention, recall and cognitive throughout, and increased errors and uncontrolled sleep attacks (National Heart, Lung, Blood Institute and National Center on Sleep Disorders Research Working Group, 1999). The effects of sleep deprivation can hit suddenly. "Studies have shown that by reducing total sleep time by one to one and half hours for one night, you get decreases of up to one-third in objective alertness, and when a person builds up a "sleep debt", an accumulation of lost sleep, the body can with ruthless prejudice, call in the debt"(Kushida, msnbc, 2003). While getting one restful nights sleep can feel refreshing, it doesn't make up for hours of sleep. "So if a person misses one hour of sleep per night for five nights, they would need five more hours of sleep on the week-end to catch up for the sleep deprivation of the last week" (Rothenberg, 2003).

Most doctors agree that to get good nights sleep; one needs to practice Sleep Hygiene. Sleep hygiene is defined as: giving oneself permission to go to bed, unwinding early in the evening, keeping regular hours, develop a sleep ritual, create a restful place to sleep, exercise regularly, cut down on stimulants, sleep on a comfortable and supportive mattress and foundation, don't smoke and reduce alcohol intake. The room or place that is used for sleeping

should be relaxing and quiet. Lights, noises, a room that's too hot or cold, or an uncomfortable bed, can keep people/firefighters from getting the sleep that they need. A dark room is more conductive for sleep, both night and day. The temperature should be 60 to 65 degrees Fahrenheit. Loud sudden noises from outside as well as the inside should be kept to a minimum. The bed should not only be a matched set (engineered to work together), but also used just for sleeping, not staying up watching television or reading. If one can't get to sleep, don't just lie in the bed, get up move around, and try again in a half hour (The better sleep council). Researchers also have found that "During the day, one's environment needs to be bright. The circadian rhythms are weakened by or desynchronized by environmental factors such as decreased light. Several studies have indicated that bright light exposure will improve sleep and agitated behavior. It also states that window curtains should be open during the day and people should be encouraged to spend time outside whenever possible (Sleep Medicine Alert).

Some new research from Penn State's College of Medicine shows that even one night of disrupted or missed sleep by a healthy person can drastically alter a person's chemical balance and cause daytime sleepiness and fatigue. The results of such sleep deprivation can reduce productivity as well as increase the chances of accidents at home or at work. Researchers are currently investigating the effects of acute and chronic sleep restriction on the neurobehavioral functions and the emotional, physical and psychological responses. Experiments have demonstrated that restricting sleep, even to six hours a day, results in accumulating cognitive deficits that reach severe levels of impairment within one week, this without the subjects being aware of their levels of sleepiness (David F. Dinges, PhD.). " The consequence of sleep deprivation is sleepiness. This often manifests itself as involuntary dozing, poor concentration, and performance decrements. The impact on job performance is significant, particularly where tasks require concentration or mental flexibility. Social relationships suffer from the irritability

and rigid thinking as well. Lack of sleep causes slowing of reaction and inattention almost identical to alcohol" (Calvin Stafford, M.D.). When sleep deprivation becomes great enough, the effects mimic those of psychosis (a fundamental lasting mental derangement characterized by defective or lost contact with reality). Not only can sleep loss / sleep deprivation cause stress, but stress can cause sleep loss. People suffering from sleep loss also have trouble handling stressful situations, difficulty making decisions, difficulty listening, and have difficulty relating to their co-workers. Many people complained that their concentration levels were only 70% after sleep loss. Previous studies of both men and women found short-term sleep deprivation can raise blood pressure and levels of the stress hormone cortisol, lower glucose tolerance and lead to variations in heart rate---all precursors of heart disease (msnbc 2003). Knowing when a person needs sleep and when they will be at their maximum performance level is based on the circadian rhythm. Everyone has a circadian rhythm, or body clock, that runs for about 24 hours. At about the 18-hour point of being awake, a person will start to experience performance deficit. At 18 hours you'll start to feel tired, like you need sleep. There's a reason for that. Your circadian rhythm is on it's downside. You will start having reaction time problems, and if you stay awake that whole first day, your performance will drop by 20 or 25 percent (Smith, 2002).

Stress can be defined as the harmful physical and emotional responses that occur when the requirements of the job do not match the capabilities, resources, or needs of the worker. Stress can lead to poor health and even injury. The stress response of the body is that virtually all systems (the heart and blood vessels, the immune system, the lungs, the digestive system, the sensory organs, and brain) are modified to meet the perceived danger. Stress sets off an alarm in the brain, which responds by preparing the body for defensive action. The nervous system is aroused and hormones are released to sharpen the senses, quicken the pulse, deepen respiration and tense the muscles. This is sometimes called, fight or flight response This response is

preprogrammed biologically. When stressfulness goes unresolved (like sleepiness) the body is kept in constant state of activation, which increases the rate of wear and tear to the biological systems. Ultimately, fatigue or damage results, and the ability of the body to repair and defend itself can become seriously compromised. As a result, the risk of injury or disease escalates. Evidence is rapidly accumulating to suggest that stress plays an important role in several types of chronic health problems-especially cardiovascular disease, musculoskeletal disorders and psychological disorders. Many studies suggest that psychologically demanding jobs that are stressful increase the risk of cardiovascular disease. On the basis of research by NIOSH (The National Institute for Occupation Safety and Health) and many other organizations, it is widely believed that stress increases the risk for development of back and upper-extremity musculoskeletal disorders. Several studies suggest that some mental health problems (like depression and burn-out) are partly due to stress. Symptoms of depression include: lose of energy and interest, diminished ability to enjoy oneself, decreased or increased sleeping or appetite, difficulty in concentrating; indecisiveness; slowed or fuzzy thinking, exaggerated feeling of sadness; hopelessness; or anxiety, feeling of worthlessness, recurring thoughts about death and suicide. Although more study is needed, there is a growing concern that stressful working conditions interfere with safe work practices and set the stage for injuries at work. Early warning signs of stress include: headaches, sleep disturbances, difficulty in concentration, short temper, upset stomach, job dissatisfaction, and low morale"(NIOSH).

As stated above the typical type of injuries are major and minor sprains and strains. Sprains and strains are traumatic injuries to muscles, tendons and ligaments and joints. These types of injuries are classified as musculoskeletal disorders (MSDs). MSDs can be worsened by factors in the work environment, causing work-related musculoskeletal disorders (WMSDs). WMSDs can cause severe and debilitating symptoms such as pain, numbness, and tingling;

reduced worker productivity; lost time from work; temporary or permanent disability; inability to perform job tasks; and an increase in worker compensation cost (Whorton 2003). The following risk factors contribute to WMSDs: repetitive, forceful, or prolonged exertions of the hand, frequent or heavy lifting, pushing, pulling, or carrying of heavy objects; prolonged awkward postures; and vibration. The risk for musculoskeletal problems increases if risk factors are combined through working conditions or the job environment. The level of risk depends on how long a worker is exposes to these conditions, how often they are exposed, and the level of exposure (NIOSH).

LITERATURE REVIEW

In his book " Power Sleep" Dr. James B. Maas discusses a new and revolutionary approach for peak performance, in the work place and at home. He goes over the functions of sleep, why we need sleep, how much sleep we need every day, what it takes to get quality sleep, what a good sleep environment is, and what good and bad sleep hygiene is. The type and kind of sleeping apparatus that is needed for high quality restful sleep, and why that is so important.

The book goes in to detail about how loss of sleep/sleep debt is detrimental to our neurobehavioral functions, and the emotional, physical and physiological responses. One of the many things that accompany sleep debt is reduced productivity. With a reduction in cognitive functioning and reaction time also comes the following: reduced ability to concentrate, reduced ability to remember, reduced ability to handle complex tasks, reduced ability to think logically, reduced ability to assimilate and analyze new information, reduced ability to think critically, reduced decision making skills, reduced communication skills, reduced motor skills and coordination and reduced perceptual skills. How would the loss or reduction of any of these fore mentioned skills be to a command officer or Firefighter at an emergency scene?

PROCEDURES

Utilizing the Internet I searched for information about my subject. With so many sites to choose from and so many ways to word the question, one can waste a lot of time, on the World Wide Web. Going from this site then that site waiting for them to download, then another site and another, then having to close window after window of advertisements that had nothing to do with what you were looking for. So much information out there, but how do you get to it, a lot of professional pages are restricted to members only, the need for a name and pass word to get in, or down load data. In my case I wasn't allowed download off the EMU web page. By going to open pages like some of the NIOSH study pages, and others from The Sleep Foundation, the Better Sleep site, the Newsweek page and many more, I was able to put together enough information for this report. I also interviewed an owner of a mattress factory in Detroit, he was full of helpful information about how mattress and foundations were made, and what to look for in a quality product. I called the International Association of Fire Fighters, trying to see if they had done any studies on my subject, they would not even talk to me with my local union president calling them back and giving the OK. They never called back, not even you might try this web site or this or that magazine, thanks. When I called Fire House magazine, I had to leave a message. To my surprise the next day I not only got a call back, but also a fax with information. I also bought the book "Power Sleep", this also was a great source, and helped with my guideline.

RESULTS

The Better Sleep Council states that if we are not sleeping as well as we should in our bed, you may want to consider that your mattress, foundation and bed frame could be robbing us of sleep. It may be time for a new sleeping apparatus (mattress, foundation and frame) if: one wakes up with pain; stiffness; or soreness, you are not sleeping as well as you were a year ago, if you had your best nights sleep somewhere other then your own bed, your mattress shows visible signs of wear and tear. It continues, the six things to look for when buying a new mattress are: comfort, support, space, durability, matching sleep sets and value. Comfort of the mattress doesn't mean it has to be as hard as a rock; it needs to provide the necessary support for our body. Support from a good quality mattress, foundation and bed frame should gently support your body at all points and keep your spine in the same position as a good standing posture. When selecting a mattress, keep in mind that your body should be able to relax, with your spine supported in its natural curve. Space; select a mattress that gives you enough room for easy movement and to feel comfortable. Durability refers to how long the support and comfort will continue. Like all products, a mattress, foundation and frame will gradually wear out. Eventually, you won't receive the same support and comfort as you did when the sleep set was new. Matching mattress and foundations are engineered to work together. Mismatching sets, putting a new mattress on an old foundation or adding a board between the two pieces can impede comfort and reduce the useful life of the mattress. If you put the new mattress and foundation on an old worn bed frame, or one that was not made to handle the weight or heavy usage, is will also reduce the useful life of the sleep set. Value; buy quality products made with all new materials (29 states, the District of Columbia and Detroit have laws requiring mattress manufacturers to identify mattresses constructed with new materials). Shop for the best value-

not the lowest price- this is a healthy investment in your quality of life and health. Better sleep begins with your mattress. As we can't always get all the sleep we need, we should strive to get the most out of the sleep we do get. An uncomfortable mattress, foundation and frame can rob you of sleep, causing you to toss and turn and preventing you from deriving the full benefit of your time in bed. Sleeping on a mattress set that meets your needs for comfort, support and space can help you sleep better (The Better Sleep Council 2001). As I have shown before, a good comfortable mattress set is a big part of sleep hygiene.

The research of David F. Dinges, PhD., has focused on ways sleep and the endogenous circadian pacemaker interact to control wakefulness and waking neurobehavioral functions such as physiological alertness, attention, cognitive performance, fatigue, mood, neuroendocrine profiles, immune responses and health. What are the neurobehavioral consequences of sleep loss, factors that impair sleeping, the pervasiveness of sleepiness and new ways to manage sleepiness? "What is the function of sleep? This fundamental question has two levels. An extensive description of the neurobiological mechanisms of the sleep will likely reveal multiple functions at a base, probably subcellular, level. At a more molar level, sleep promotes subsequent wakefulness. The stability of the wake state, alertness, and how well the brain functions cognitively and emotionally all depend upon an adequate duration of quality sleep. If we don't sleep enough, waking is eroded, even though we may not be aware of it. So if sleep is essential for waking, then how much sleep is needed? Although the duration of sleep needed for stable waking functions varies among individuals and across the life span, we need an average duration of eight hours a night (Dinges, 2003). The proper amount of sleep is as important, as an insufficient amount sleep, as these may impair job function, cardiovascular function, our health, well being, and an increased chance for accidents or injuries.

We all need a good night sleep to feel refreshed, and ready to go. So if one sleeps at night but still is feeling tired and unrefreshed in the morning or during the day that might signal a sleep problem, like; stress, sleep debt or bad sleep hygiene. "Engaging in behaviors that are not conductive to sleep just before one goes to bed, like paying bills, talking on the phone, getting into an argument, watching the big game, laying in bed reading, watching television in bed or going on fire emergency calls, these are some examples of bad sleep hygiene. These actives aren't helpful when the lights go out and you try to sleep. But sometimes poor sleep is caused by something as simple as where we sleep and what we sleep on"(Zammit, 2003). While one restful nights sleep can feel refreshing, it doesn't make up for hour of sleep debt.

Some firehouses are more conducive to high quality restful sleep. While others, were built without sleep hygiene in mind. A lot of firehouses are built on main streets, some next to the side walk or near a traffic light. There are some firehouses that are on two main roads, where there is never a quiet moment out side, as there is traffic (both ways) 24-hours a day seven days a week. On top of this how many fire companies run out of any one Firehouse, Engine Pumper, Ladder Truck, Rescue Squad, Battalion Chief or EMS? What if only the Battalion Chief goes (only the lights and alarms in sleeping area will go off), and he activates his siren, lights and horn as he's leaving quarters? How about when the EMS personnel who work different shifts then the Firefighters, (they could be on an 8 or 12 hour work tour) and they get a run, how much noise and commotion is made both leaving and returning to quarters? Some quarters don't have air conditioning, and the windows have to be open (to move air) now all the noises from outside cascade through these openings. Cars racing by, the squeal of tires as brakes are jammed down, people yelling and singing loudly, bottles breaking and all the other noises of a big city come pouring in. How does one turn this barrage of life sounds, flowing in from the outside, into restful quality sleep? There is always a noise of some sort inside the Firehouse. In the dorm, an

open area where the Firefighters sleep, even at night it has noises of it's own. The beds creek from individuals tossing and turning, the floors creek from people walking to the bathroom or down stairs, lights going on and off in the open wash room/ bath room and the flushing of toilets. These noises are associated with any group of people living and sleeping in the same area, let alone firefighters. Firefighters are always cooking up something, some practical joke, some plot for amusement, the rustling about, and the muted laughs; these are also the noises of living in a closed environment. Firefighters go on emergency calls at all hours of the day and night, from false alarms, to auto accidents with and with out injuries and fatalities, fires at one family dwellings, two flats, apartment buildings or industrial sites. Whether it is a short run where you were picked up (put back in service) before the apparatus arrived on the emergency scene, was it a false alarm, maybe a ten minute trash fire, a dwelling fire with people trapped inside, working hard for an hour, or maybe you went to a major fire of two, three, or four alarms of fire, how many hours will you be away from the Firehouse. Now it's clean up time, you're hot, wet, sweaty and dirty, the fire apparatus needs to be restocked. The used air bottles on our harness have to be replaced and then filled with compress air. Fire reports have to be made out. How much time does even a small fire or emergency take out of the day in hours and minutes? How long before things calm down? After all of this, when will a Firefighter be able to put his head down on a pillow and fall asleep? How much sleep a day does a Firefighter get on a workday? What if we're busy two or three workdays in a row, with only four or five hours of sleep per day, how long will it take to make up for the loss?

How many hours of sleep loss, until it becomes sleep deprivation? It was quoted in many places that people suffering from sleep loss think that they' performing better then they actually are in all kinds of situations. How many hours of bad sleep, before it's hard to make decisions? How many times do the lights (alerts) have to go on in the night before the biochemical balance

of ones body stop working properly? Many of the naturally occurring hormones secreted by the different glands in our bodies, are thought to affect circadian rhythmicity. Melatonin is just one of these, and is secreted only in the dark. "Melatonin's secretion is one of hundreds of circadian rhythms in the bodily functions controlled by the superachiasmatic nuclei (SCN) of the hypothalamus, which comprise the body's master clock. Melatonin receptors have been found in the SCN, which is itself restrained by electrical lights and daylight signals received through the eyes" (Lamberg, 1996).

"People should start thinking of adequate sleep not as a luxury but more as a component of a healthy lifestyle. Researchers suggest that getting enough sleep may be nearly as important to heart health as eating right and exercising. And they point out a recent pool that found that about one person in three has long-term sleep deprivation. Again previous studies found short-term sleep deprivation can cause blood pressure to raise levels of stress hormone cortisol, lower lucose tolerances and that it can also lead to variations in the heart rate, all of these things are associated and precursors of heart disease and heart attacks" (MSNBC, 2003).

Recent research suggests that each day with insufficient sleep, our sleep debt increases, when this sleep debt becomes large enough, noticeable problems appear (Coren, 1996). "These sleep debt related problems are most predictable at certain times of the day. This is because the efficiency of our physical and mental functions show cyclic increases and decreases in the form of circadian rhythms. While our major sleep/wakefulness rhythm has a cycle of 24 hours, there are shorter secondary cycles of about 12 hours.

Because of these cycles, the pressure to fall asleep is greatest in the morning, between 1 and 4 a.m.. There is also a less pronounced but noticeable increase in sleepiness12 hours later, between 1 and 4 p.m.. It is this low point that makes us sleepy after the noon meal, not lunch itself.

People with sleep debt are less efficient, and it's at it's highest when the circadian cycle is at it's low point. Large sleep debt consequences are; reduction in short-term memory capacity, attentional lapses, impaired judgment, difficulty making decisions, mood swings and the occurrence of microsleeps. Microsleeps are short periods of time, usually between 10 seconds to a minute long. During microsleep the brain goes into a sleep state, regardless of what else the person is doing, at the time. These momentary black outs can occur without the person realizing it. The effects of microsleeps along with attentional lapses, can be very dramatic" (Coren, 2003). Many major disasters; the Exxon Valdez, Chernobyl and Three Mile Island nuclear accidents and the Challenger accident, are all related to the effects of sleep-debt.

Sleep deprivation, which is a form of sleep-loss and sleep-debt, have negative effects that are measurable. Job performance, mental and physical health are adversely effected. If we don't get a good nights sleep, we more then likely end up paying for it. The high cost of this payment includes: reduced energy, greater difficulty concentrating, simple tasks can become complicated, reaction times slow down or take longer, uncertainty, diminished mood, stress starts and/or increases, depression, decision making skills diminish, greater risk for accidents, including fall-asleep crashes and an increase in the probability of injuries at work or home. Work performances along with work and personal relationships can and do suffer. Pain may be intensified by the physical and mental consequences of lack or proper quality restful sleep (Coren, 2003).

Stress comes from many different directions and for many different reasons. Stress can be caused by lack of, or loss of good restful sleep, just as stress can cause sleepiness. Stress for Firefighters also comes from many directions. Is their sleep environment conducive to a restful quality sleep, is the fire department giving the Firefighters all the tool and equipment needed to perform to the best of their ability, or do they think, it's just for those Firefighters? What happens when something goes wrong at fire, something breaks, someone gets injured, or worst

yet, someone whether a civilian or a Firefighter dies? Is the system designed to fail? Is the department set up with patchwork and bailing wire holding it together? When management says to the Fire Department, that it has to do the same amount of work with less money because of cutbacks (we can only do different with less money), does this plant the seeds of worry and stress in to the Firefighter (employee)? Firefighters leave their wife's/husbands and family at home for 24 hours, while they're at the Firehouse. What's going on at home, have the little problems turned into gigantic one while you're away. An emergency at home, do we have to rely on someone else to remedy it? What's happening at school, will one miss the after school game, what about the big game? How will we comforting and be there for our family and loved ones, when thing go wrong, whether it's a bumped knee or an auto accident? We are at the Firehouse for 24 hours at a time. All of these extra burdens, are inflicted, on our loved ones and ourselves. Do these things add to or create stress, do they distract us from the job at hand? Will it affect the sleep and rest we all need, to perform at our best?

DISCUSSION

The importance of where we sleep, what we sleep on, for how long we sleep and if it is restful quality sleep, and how that effects our physical and psychological functions and well being, has been well documented by many sources and the Internet. In his book Power Sleep, Dr. James B. Maas, goes into the many facets of sleep and what it does for us. He states, " The process of sleep, if given adequate time and the proper environment, provides tremendous power. It restores, rejuvenates, and energizes the body and the brain. The one-third of our life that we should spend sleeping has profound effects on the other two-thirds of our life, in terms of alertness, energy, mood, body weight, perception, memory, thinking, reaction time, productivity,

performance, communication skills, decision making skills, creativity, safety, and good physical and psychological health". This covers many of the skills needed for optimum performance of Firefighters at emergency scenes. Stanley Coren PhD., whom is the head of Human Neuropsychology and Perception Laboratory of the psychology department of the University of British Columbia, concurs with work, and findings of Dr. Maas. in their paper on stress NIOSH agree, with both doctors findings. The study goes onto say that a bad sleep environment and bad or lack of sleep can lead to; stress, lack of job satisfaction, exhaustion, musculoskeletal disorders, cardiovascular disorders/disease and psychological disorders.

For the extreme physical and psychological out put that Firefighters have to endure at emergency situations, they need to be well rested and up to their optimum performance levels. To do this one must have the equipment and environment to produce such results. One of the things that can be done, are to be set up with and practice, good sleep hygiene. One of the biggest factors, in good sleep hygiene, is a good quality matched bed set, that supports ones whole body comfortably. As was stated in the Fire Staff and Command class #5 " The employer (the Detroit Fire Department) has to supply all the equipment and supplies needed for the employee (Firefighters) to do their job safely and affectingly. If this is not done, the system is flawed and designed to fail." What is the cost of that failure; is it dollars and cents, the present and future physical, physiological and psychological well-being of the workers? In ending, NIOSH states that scientific evidence suggests that certain working conditions are stressful to most people. That excessive workloads, demands and conflicting expectations are all stressful. Such evidence argues for a greater emphasis on the working conditions as a key source of job stress, and calls for their redesign as a primary prevention strategy.

RECOMMENDATIONS

I have reviewed the writing of many renowned Doctorates, medical doctors, authors, research originations and Federal Government safety Agencies, for this paper. They all concurred with some basic facts of nature and human kind that is we all need to sleep. They are not sure why we sleep; most agree it has to with healing the body, reorganizing the memory and resetting the bio-clocks and bio-chemicals in the body and brain. The amount of sleep that is to function properly day in and day out is eight (8) to ten (10) hours a day. This sleep has to be continual of high quality and restful.

The expressed concern from all of these experts, on what happens when this amount of sleep falls short, is well documented. These dangerous effects can start with sleep loss in one day. Although there are no official standards for beds, most experts agree what it takes to get this high quality restful sleep. One of the major component of this is, a matched bed set, a mattress, foundation and bed frame. These need to provide comfort, support the body at all points and keep your spine in the same natural position as a good stand posture, and enough space for free easy movement.

The sleeping apparatus (bed sets) that are provided to the fire department members, are a mixed jumble of mismatched pieces, that at times are an obstacle to sleep let alone good sleep. I recommend that the city and the unions safety committee and sit down and draft a set of minimum quality standards for future bed sets. They also need to investigate what the likely life span is of a “bed set” is under the adverse conditions of use at an industrial environment like the fire department. Presently it takes over fifteen (15) years to complete a mattress replacement cycle, we need to readjust this cycle to a more realistic schedule, most brand name manufactures of mattress only warranty their best beds for ten (10) years.

To replace 302 bed sets is a large capital investment. I think that this investment of money is well spent, if only for improvement in the physical and psychological well being of the employees (this subject was covered in our Fire Staff and Command class). With this large of a purchase not only should we go direct to the manufacture, but we should have them bid against one another on a multi year contract. The factory would also be responsible for warranty items, and future replacement of beds. As with other large capital improvements not only would this have to be a multi year budgeted item, but approval by the Detroit City Council is warranted. I suggest that the new purchases and replacement could be accomplished in three (3) years.

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