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In This Issue:

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- A Study of the Effects of Post-Traumatic Stress Disorder Developed in the Workplace
- Book Review: Management Obligations for Health and Safety
- Spinal Cord Injuries: The Impact, Effect, and Returning to Work

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The E-Waste Problem of Nigeria & Proposed Solutions

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Abstract

E-Waste disposal in Nigeria is poorly managed. The products of E-waste can cause adverse ill health effects if allowed to contaminate the soil, plants and water. This article identifies the current disposal practices and recommends more effective and safer ways to dispose of E-waste in Nigeria. The recommended disposal options are applicable to developing best practice for E-waste recycling, minimization, and safe disposal for countries worldwide.

Keywords:

E-waste management. Municipal waste. Nigeria. Health & Safety. Public Health.

Introduction

Nigeria is a tropical country on the west African coast along the Gulf of Guinea. It covers an area of some 923,769 square Km. and is situated between latitudes 4° and 14° N of the equator. The capital city of Nigeria is Abuja. Major cities include Lagos, Port Harcourt, Aba in Abia State, and Kaduna. In July 2011 the population of Nigeria was 155,215,573 people with a population growth rate of 1.9% per year and a

life expectancy at birth of 47.56 years (Omuidi Index, 2012). Nigeria is composed of more than 250 different ethnic groups, has over 500 indigenous languages, and is Africa's most highly populated country. According to the results of the 2006 census report published by the National Population Commission of Nigeria (last National Census results published), the country has a total number of 36 states with the major industrial states being Anambra, Imo, and Abia State in the eastern part. In the western part there is Lagos, which is the industrial and commercial centre of Nigeria and the location of 60-70% of the nation's industries.

Table 1: Figures of population of major cities in Nigeria.
(Source: National Population Commission of Nigeria, 2006)

Major Cities	Population
Lagos	11.4 million
Kano	3.3 million
Ibadan	3.3 million
Benin City	1.2 million
Port Harcourt	1.2 million
Maiduguri	1.1 million
Zaria	1.0 million



Figure 1. Map of Nigeria (Wikipedia, 2012, p.1)

Background of Municipal Waste

All waste can be divided into two main categories - solid waste and hazardous waste. Solid waste is then divided into municipal solid waste (MSW), industrial waste, electronic waste (otherwise known as waste from electrical and electronic equipment (WEEE)), and finally the biomedical waste (Miller & Spoolman, 2012). Total solid waste is classified as everything that people in Nigeria throw away each day and discard. Waste, both from domestic and commercial sources, has grown significantly in Nigeria over the past decades, and it has been stated that the waste density in Nigeria ranges from 280 to 370 kg/m³ and the waste generation rates range from 0.44 to 0.66kg/capital/day (Miller & Spoolman, 2012). Waste management, involving the collection, transfer, treatment, recycling, resource recovery, and disposal of the solid wastes that are generated in Nigeria, has been a struggle (Ogwueleka, 2009). This paper assesses the problem of E-waste in Nigeria with the aim of proposing a feasible solution to the waste management of Electrical and Electronic Equipment problems.

Description of E-Waste

Electronic waste is known as E-waste, E-scrap or waste of electrical and electronic equipment nearing the end of usefulness or end-of-life.

Electronic waste (E-waste) is a term that is used to refer to obsolete, broken, or irreparable electronic devices, like televisions, discarded computer monitors (flat screen and cathode ray tubes), computer central processing units (CPUs), laptops, mobile phones, entertainment device electronics, printers, scanners, and other electronic communication products which have been disposed of by their original users.

Known and Suspected Routes of E-Waste Dumping

The Basel Action Network (BAN) is a body responsible for ensuring the implementation of the Basel Convention on the Control of Trans-boundary Movement of Hazardous Wastes and their Disposal which is an international treaty designed to reduce the movements of hazardous waste from developed countries to less developed countries (LDCs) (Basel Action Network, 1989).

According to the findings of investigations into dumping of used electronic equipment in Nigeria dumping is a result of the growth in the Information Technology (IT) SECTOR in Nigeria, which is similar to other developing countries, where there has been a boom of importation of commonly called “second hand goods” or “non-tested end of life products” (Ewaste, 2011). These products are sent from developed countries like the United States of America, the European Union, South Korea, Japan, and Australia to Nigeria, thereby contributing to E-waste in Nigeria (Basel Action Network, 2012). About 25% of this equipment is repaired or refurbished for use in Nigeria and is becoming important components in bridging the

digital gap, but 75% is beyond repair and ends up in Municipal Waste Dumps in Nigeria (UK Department for Business, Innovation & Skills, 2012).

Components of Electronics and Effects of these on Human Health

Nnoroom in 2009 (cited in Osibanjo, 2009) conducted an E-waste contamination environmental assessment in Africa. This research identified that in Nigeria there were high soil concentrations of copper, nickel, lead, and zinc in the E-waste disposal sites in Lagos, Benin City, and Aba in Nigeria that majorly exceeded

the European Union safe limits. Surface water and plants near E-waste disposal sites in Nigeria were found to be heavily contaminated in this study. Environmental contamination can affect the health of the population that lives near contaminated soil, plants, and water.

Improperly discarded electronic products can create hazardous waste from the flame retardant substances used in plastics and circuit boards, solders containing lead and tin, barium and lead in cathode ray tubes, mercury and beryllium alloys in connectors, among other potential environmental hazards. Some of the effects of electronic waste components include:

Table 2. Effects of E-Waste constituents on health

Source of e-wastes	Constituent	Health effects
Solder in printed circuit boards, glass panels and gaskets in computer monitors	Lead (Pb)	Damage to central and peripheral nervous systems, blood systems and kidney damage. Affects brain development of children.
Chip resistors and semiconductors	Cadmium (Cd)	Toxic irreversible effects on human health. Accumulates in kidney and liver. Causes neural damage. Teratogenic.
Relays and switches, printed circuit boards	Mercury (Hg)	Chronic damage to the brain. Respiratory and skin disorders due to bioaccumulation in fishes.
Corrosion protection of untreated and galvanized steel plates, decorator or hardeners for steel housings	Hexavalent chromium (Cr VI)	Asthmatic bronchitis. DNA damage.
Cabling and computer housing	Plastics including PVC	Burning produces dioxin. It causes reproductive and developmental problems; Immune system damage; Interfere with regulatory hormones
Plastic housing of electronic equipments and circuit boards.	Brominated flame retardants (BFR)	Disrupts endocrine system functions
Front panel of CRTs	Barium (Ba)	Short term exposure causes: Muscle weakness; Damage to heart, liver, and spleen.
Motherboard	Beryllium (Be)	Carcinogenic (lung cancer) Inhalation of fumes and dust causes chronic beryllium disease or berylliosis. Skin diseases such as warts.

Sources of E-waste in Nigeria include the following:

- Importation of electronic accessories, especially the un-usable parts.
- The importation of used electrical electronic equipment.
- Local generation from consumption of new electrical electron equipment.
- Donations, usually from overseas, to charity organizations and academic institutions, etc.

Methods of E-waste Management in Nigeria

Correct waste management simply means the collection, keeping, treatment, and disposal of waste in such a way as to render the waste harmless to humans, animal life, the ecology, and the environment generally. It could also be defined to be the organized and systematic dumping and channeling of waste through pathways, or landfills, to ensure that the waste is disposed of with attention to acceptable public health and environmental safety. Thus proper waste management is expected to yield a result that will abate any E-waste problems in Nigeria.

In Nigeria the infrastructure for solid waste management is weak and ineffective. There is neither a well established system for separation, storage, collection, transportation, and proper disposal of E-waste; nor are there any practical regulations that can take absolute care of issues surrounding hazardous waste management in the states of Nigeria. Normally E-waste management is poor as the waste is disposed:

- (a.) In urban dumpsites into the rivers and ditches;
- (b.) Bashing open cathode ray tubes with hammers, exposing the toxic phosphorous dust inside;
- (c.) Cooking circuit boards in works over an open fire to melt the lead solder;

- (d.) Sale of reusable and serviceable parts;
- (e.) Burning the plastic casings creating dioxins and furans, some of the most poisonous fumes that can be breathed in;
- f.) Materials recovery of recyclables such as copper, gold, and silver from non-repairable E-waste by open burning of cables.

These crude methods, employed in Nigeria toward E-waste management, are practices and techniques which are non-rudimentary. The citizens embark on these practices in oblivion of the health implications that result due to unprotected exposure to the hazardous constituents of the waste of electrical electronic equipment. In practice the widely used E-waste management methods in Nigeria have included the manual dissembling of waste of electrical electronic equipment without consideration of the hazardous nature of the constituents. For example, there have been cases of recovery of solder and chips from Printer Circuits Boards (PCBs) by heating them. PCBs are self-contained modules of interconnected electronic components formed by a thin layer of conducting material deposited, or printed, on the surface of an insulating board. They contain elements that are potentially toxic if they are released into the environment.

Proposed Solutions for E-waste Management in Nigeria.

(a) Recycling

During recycling of E-waste, which is a complicated process, E-waste components are stripped apart by hand and put through several delicate processes in order to recover 95-98% of materials from the E-waste. The raw materials that remain—such as glass, copper, plastics, and metals—can be recycled to good use instead of wasting valuable space in landfill and contaminating the environment.

In the management of E-waste, the most practicable hierarchy is as follows:

- Reuse, repair, or refurbishment of the electronics
- De-manufacturing and disassembly
- Recovery of valuable components
- Hazardous and base metal recovery
- Hazardous component management and environment-friendly disposal

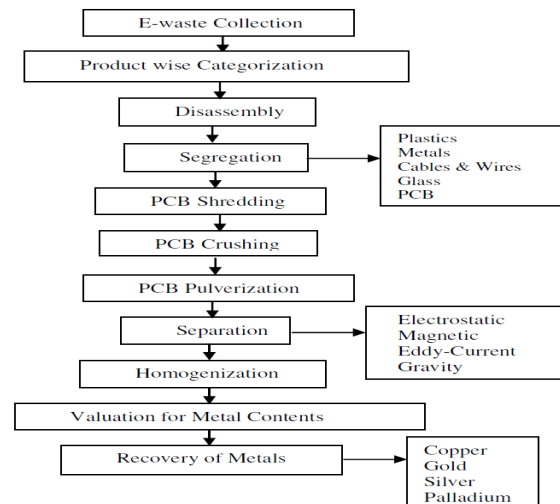


Figure 2. Process flow chart for recovery of saleable materials e-waste.

(Source: Sukanya, 2012, p.24)

(b) Shredding

When components, that can be recovered, are obtained from electronics approaching their end of life, then E-waste can be processed through the use of shredders to obtain suitable materials for the recycling process. For the segregation of the electronics components the technology of the shredder is highly efficient and can be used in Nigeria to separate the E-waste. The shredder is a machine that can be used to reduce the components of the E-waste. The waste material to be shredded is directed to the center of the counter-rotating shafts. Thus the size of the waste material is reduced by the shearing or tearing action of the cutter discs. E-wastes like electronic scrap, hard drives, monitors, TV wires and cables, printers, circuit boards, cell phones, DVDs, CDs, and keyboards can all be processed for recycling. Thus the use of low speed, high torque shredders with 3, 4-shaft can be suitable for assisting with effective E-waste disposal and reduce the E-waste materials to a uniform and desirable small to medium particle size.

These processed materials can be stored in various material streams. This can be done by using magnetic separation. This is a unit

In Nigeria, if E-waste can be separated into their various components properly, this will encourage efficient recovery of useful metals and other elements.

operation in which ferrous metals and non ferrous metals are separated from other waste materials by utilizing their magnetic properties. Thus ferrous metals are attracted, and also separated from, the non-ferrous metals. This is achieved through the use of eddy-currents and induction and can yield a proper segregation of the E-waste. In the head of the head pulley a conveyer has a permanent magnet and spins at a high rotation speed. A reversed magnetic field is generated when a conductor is present, a charge is generated and, as a result, the conductor will be lifted and will land away from the non-conductor particles. The ferro-metals are attracted and also separated by this process (Doms, 2012).

In Nigeria, if E-waste can be separated into its various components properly, this will encourage efficient recovery of useful metals and other elements. Through smelting metals this recovery can allow for the recycling of useful products like gold, copper, and other precious metals such as palladium. Analytically, a total of 5.23kg CO₂ could be saved per desktop computer disposal by recycling materials compared to primary mining of the same amount of metals. (Chatterjee & Kumar, 2009).



Fig 3. A shredding machine for segregation proposed for Nigeria (Serpo, 2008, p. 8)

Recommendations and Conclusions

As a result of this review the following recommendations are made for E-waste management.

- The Government of Nigeria should ensure that the Basel Convention is implemented and the importation of E-waste scraps should be banned from entering the country of Nigeria. Outright banning of used electrical electronic equipment (UEEE) is not advocated, but the Government of Nigeria should, through development of national/sub-regional/regional legislative and regulatory control of the importation of electronic equipment, control the supply chain based on the lifecycle approach (Osibanjo, 2009).
- There should be practical methods of collecting used electrical electronics from Nigerians, so take-back centers should be inaugurated in all the regions of the country.
- Recycling should be encouraged by both the private and the public sector. The reason

for the involvement of the informal sector is that recycling can be a financial generating area for the country, since the quantities and qualities of the materials recovered from the E-waste has a high market value.

Through efficient execution of the E-waste recycling in Nigeria, there will be more profit to be derived from the E-waste than its demerits. This is in line with the cradle-to-grave proposition in waste management. This approach encourages sustainability thinking and strikes people's consciousness on the need to minimize the environmental impact of products by employing sustainable production, operation and disposal practices. It aims to incorporate social responsibility into product development (Doms, 2012). This approach of E-waste recycling in Nigeria will optimize human health and keep the manufacturers responsible for their products, thereby minimizing the negative environmental impacts of E-waste in the cities of Nigeria.

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A Study of the Effects of Post-Traumatic Stress Disorder Developed in the Workplace

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Abstract

This report is a literature review on the effects of post-traumatic stress disorder (PTSD) developed in the professional environment. It was found that PTSD is an increasing and significant ailment in the contemporary work environment and has immense effects on the sufferer's emotional and physical wellbeing as well as surrounding members within their network. This article examines the affected individual's legal obligations under Western Australian law and identifies that PTSD contributes significantly on an individual's return to work effort. The easily feigned nature of the disorder, combined with current economic uncertainty, is shown to negatively contribute to the unhindered fulfillment of legal obligations by employers and insurers.

Key words:

Accident. Bullying. Compensation. Injury. Mental health. Occupational health and safety. Post-traumatic stress disorder (PTSD). Return to work. Stress. Trauma.

Introduction

Post-traumatic stress disorder (PTSD) is a psychological condition that occurs in individuals as a response to an event involving either near or threatened death, a serious injury or a threat to the physical integrity of self and others (MacDonald, Colotla, Flamer & Karlinsky, 2003). The traumatic event in question can occur to possibly anyone and can result from a wide range of situations (Guy & Guy, 2007); however, this report will only focus on workplace-induced trauma, resulting from events including, but not limited to, bullying, violence, accidents, work pressure, and injuries (Guy & Guy, 2007).

In Australia during the three year period of 2001-2003, stress-related compensation claims comprised only 5% of all worker's compensation claims, but had the highest median claims cost at \$9,700, second highest average cost at \$16,400 and the total worker's compensation claims were estimated to be at approximately \$200 million per year (Work related mental disorders in Australia, 2008). With these high figures, it is surprising to find

that PTSD is a relatively understudied and underreported field and can often be misdiagnosed as workplace stress (MacDonald, Colotla, Flamer & Karlinsky, 2003). In 2009-10 mental disorders were the most commonly reported disease for workers' compensation claims in Australia and had a median workers' compensation claim cost of \$18,000 in 2008-2009 (Safe Work Australia, 2012). This paper examines literature concerning PTSD, its effects upon sufferers and their occupational and social circles, as well as the pathway to compensation and eventual return to work.

Research Methodology

Curtin University's collection of subscribed journals was a primary source of referenced material for this literature review through the use of the above keywords. Secondary sources include Google Scholar, the WorkCover WA website (www.workcover.wa.gov.au), the Australian Legal Information Institute website (www.austlii.edu.au), and Western Australian legislation related to occupational safety and health and to workers' compensation and injury management. All referenced peer-reviewed articles were written no earlier than 2001 in an effort to keep information relatively recent due to the misunderstood nature of PTSD. There were three exemptions to this rule, with all three specifically sought out due to their reference in other more recent articles. A total of 44 articles

were reviewed, and 19 are referenced in this article.

Effects of PTSD on the Individual, their Family and their Workplace

Individual

Rainbird (2009) states that up to 81% of men and 74% of women will experience one traumatic event in the lifetime. Guy & Guy (2007) reflect a similar figure but continue on to state that 20-50% of individuals that have experienced a traumatic event will develop PTSD and that 25-33% of sufferers of traumatic experiences that occurred in the workplace will endure long term effects. This article also stated that the full extent of this is unknown due to lack of reliable data. The development of PTSD in an individual is based on the combination of a number of situational factors; such as nature, type and scale of traumatic event, and personal factors such as previous exposure to trauma, mental health, and personal traits (Rainbird, 2009; Hillenberg and Wolf, 1989).

The reaction to trauma can be placed under three main phases, which include the immediate reaction, an acute reaction in the month following the event and chronic or long-term reactions (Rainbird, 2009). Following the event, Maslach & Jackson (1984) outline three symptoms that can occur and are suggestive of PTSD. These are: reliving the experience, avoidance of stimuli associated with the event, and hyper-arousal such as impaired concentration and difficulty sleeping, impaired ability to live in the present, and inability to have positive emotions such as a happiness and loving feelings. These symptoms were also articulated by Horton (2011) when recounting a personal experience with PTSD that was caused by a response to the visual identification of a former soldier's military tattoo while working as an Occupational Health Manager, thus causing her to recount memories of her experiences as a military nurse in Iraq. Horton (2011) also outlined further personal effects such as the breakdown of a long-term relationship, feelings of shame, failure and embarrassment, and finally depression. Similarly, Hillenberg and Wolf (1989) state that there is a positive relationship

between the impact of the trauma and increased feelings of personal validation, vulnerability, powerlessness and fear, indicating that individuals that are more emotionally affected by the trauma are at risk of developing further mental health issues.

Family

PTSD sufferers, like most mental disabilities, can place enormous strain on family relationships. Additionally, it is the strength of these relationships that also play a major part in the recovery of the affected individual. Hillenberg and Wolf (1989) identify that the individual's family needs to understand the trauma event to aid healing. If understanding does not occur due to suppression, lack of problem solving skills, or being in a generally unsupportive environment, the PTSD symptoms will continue and intensify.

While a caring partner is highly important to the health of the suffering individual, the overall effect on partners of PTSD sufferers can be varied. A study performed by O'Toole et al (2010) examined the mental health of partners of Australian Vietnam war veterans three decades after the conclusion of conflict. The study found higher than expected rates of anxiety disorder and severe recurrent depression. Additionally, the study found a positive correlation between the intensity of the PTSD sufferer's combat history with the intensity of their partner's anxiety and depression. A second study, based in Montreal, by Chartier-Otis, Guay and Marchand (2009) examined the impact on partners from civilian PTSD sufferers. The results failed to present a statistically significant correlation between a partner's distress and the PTSD sufferer's symptoms. Fewer than 20% of tested candidates exhibited depression and anxiety and only 37% exhibited relationship distress. While the results of the two studies are mixed, they do reflect findings by Hillenberg and Wolf (1989) who state that the intensity of the effects of PTSD on an individual are positively related to the intensity of the traumatic event; therefore, it can also be argued that there is an increased effect on the family of the PTSD sufferer due to a more volatile event.

Workplace

Similar to most other forms of mental health issues, an employee's suffering can greatly contribute toward organizational dysfunction in the form of absenteeism, increased staff turnover, decreased productivity, and poor morale (Work related mental disorders in Australia, 2008).

However, with the aforementioned increases in PTSD and other mental health related cases, its largest effect on a workplace is compelling an organization to implement measures to assist in the rehabilitation of potential victims (Rainbird, 2009). Rainbird (2009) states that these measures have generally been implemented in workplaces whose employees are at a high risk of developing PTSD and include factors such as risk management, auditing processes, education and training, and post incident support. Furthermore, Rainbird (2009) suggests that if an organization does not include PTSD support measures as a part of its operation it is potentially at risk of being liable for psychological injuries.

Badenhorst & Van Schalkwyk (1992) reinforces Rainbird's suggestions that if an employer does not implement PTSD support measures the increase in medical costs, compensation costs, and staff turnover can impact an organization significantly. Badenhorst & Van Schalkwyk's (1992) research find that with PTSD support measures implemented, an organization can potentially save up to five times the cost in employee rehabilitation and have the affected staff member return to work up to three times earlier. Employees who received satisfactory care from the employer were also less likely to litigate.

Obligations of the Employee under the Workers' Compensation and Injury Management Act, 1981

Pre-injury, every employee is legally obligated to take reasonable care within their work environment to protect themselves and others from incurring an injury, and to report an injury if it has occurred. A failure to do so is considered an offence, and the employee in question may be penalized (Occupational Safety and Health Act of Western Australia, 1984, Section 20).

"Pre-injury, every employee is legally obligated to take reasonable care within their work environment to protect themselves and others from incurring an injury, and to report an injury if it has occurred."

Post-injury, the employee is obligated to report any symptoms of PTSD and seek medical advice as soon as possible (Workers' Compensation and Injury Management Act, 1981, Section 64). If the medical advice deems that a case of PTSD is present and the employee is given a Worker's Compensation First Medical Certificate, the employee must follow the legally required workers' compensation procedures. This involves obtaining and completing a claim form and working openly with the employer and insurer to accept or dispute the claim (Workers' Compensation and Injury Management Act, 1981, Section 57). The employer may also request that a preferred medical practitioner examine the employee, however this may only be performed once every two weeks (Workers' Compensation and Injury Management Act, 1981, Section 65). While the employee is not obligated to give permission for the employer and doctor to discuss the injury, doing so will assist the fluidity of the process (Workers' Compensation and Injury Management, 1984, Section 57).

During the injury management period, the employee is obligated to participate in the employer's return to work program. Failing to do so may endanger the continuance of compensation payments (Workers' Compensation and Injury Management, 1984, Section

72). The employee has the option to participate in a vocational rehabilitation program and a third party service that is approved by WorkCover WA, which can greatly assist in the successful completion of a return to work program (Workers' Compensation and Injury Management Act, 1981, Section 146). If a decision by the employee is made to resign from the original employer, the employee is obligated to inform the employer seven days within beginning the new role (Workers' Compensation and Injury Management Act, 1981, Section 59).

Possible Barriers that Can Prevent an Employee from Returning to Work

The development of PTSD is in itself generally a barrier in an employee's effort to return to work after a workplace accident or incident (Opsteegh et al, 2009). A study by Lange, Burgmer, Braunheim & Heuft (2006) found that 32% of workplace accident victims developed PTSD and failed to return to work within 12 months of the incident. Furthermore MacDonald, Colotla, Flamer & Karlinsky (2003) found that of the employees that managed to recover from PTSD after an accident, only 43% returned to their previous role. The causes of these statistics are a mixture of both personal and workplace factors.

In the occupational sphere, Payne (2011) states that an employee should feel comfortable in taking the required time to rehabilitate from their injuries by living life as normally as possible outside of the work environment, keeping in mind that it is a legal obligation for an employer to provide a suitable return to work program for injured employees (Workers' compensation code of practice (injury management) 2005, Section 7). A workplace that is not supportive may act to instigate a greater sense of fear and shame forcing the employee to remain indoors, thus prolonging the effects of PTSD. Additionally a pursuit of compensation is found to have a negative impact on an employee's ability to return to full health as well as return to work due to the stressful nature of the process (Compensable injuries and health outcomes, 2001).

One of the symptoms of PTSD is situational flashbacks and nightmares that allow the sufferer to relive the accident continuously. This effect plays a significant part in avoidance of work due to fear (Opsteegh et al, 2009). Guy & Guy (2007) document that it is not uncommon for sufferers of PTSD to lose their jobs upon return to work due to flashbacks, thus reducing their ability to perform the required tasks. Finally, MacDonald, Colotla, Flamer & Karlinsky's (2003) study found that in some cases PTSD develops into such a serious case that it causes sufferers permanent disability, forcing either a career change or, in the worst case, a permanent inability to be employed.

Problems that May Hinder Employers and Insurers from Carrying Out Legal Obligations

On top of the numerous and complicated laws, legislation and regulations, that in themselves pose a problem for the employers and insurers in their ability to achieve a level of understanding, today's climate of economic uncertainty can be seen as a major issue for employers and insurers (Demaine, 2012). A relatively small or medium business can be at risk of not providing appropriate cover for their employees or a satisfactory return to work program due to the large costs involved. The absence of these requirements is illegal and places a number of parties at risk (WorkCover, 2011).

The issue of feigning in the PTSD realm poses another problem for employers and insurers that may disrupt any legal processes. PTSD is a relatively easy injury to feign due to its subjective nature. The process of determining whether the affected individual's compensation claim is genuine can increase difficulty in carrying out a correct compensation claim processes (Resnick, West & Payne, 2008). Additionally, the process can deteriorate the relationship between the affected employee, the employer, and the insurer. Investigations into the legitimacy of a PTSD claim can cause the sufferer to respond defensively and subsequently hinder the fluidity of the claims process (Compensable injuries and health outcomes, 2001).

Conclusion

It has shown that PTSD is a serious ailment that can occur to anybody who is placed in an extraordinarily dangerous or life-threatening situation. The mental symptoms that a case of PTSD can present are of a high intensity that it tends to affect the physical well being of a sufferer. PTSD is also prone to negatively affecting the sufferer's social and professional networks. Being such a serious mental impairment, PTSD poses many threats to an individual's ability to successfully return to work and resume normalcy within their lives,

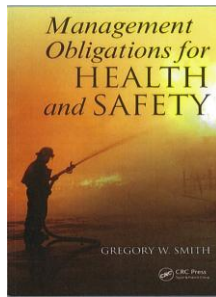
with many affected individuals experiencing permanent effects. The smooth process of making a compensation claim is also at risk due to PTSD being an easily feigned injury causing further unnecessary stress upon the employer and employee. Finally, like all mental disorders, PTSD is relatively misunderstood, understudied and on the rise in reportable cases and subsequent costs. It is hoped that a greater awareness and acceptance will be gained in the near future through further examination and research.

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Book Review:

Management Obligations for Health and Safety

Author: Gregory W. Smith.

Publisher: CRC Press. Taylor & Francis Group.

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This book highlights management's obligations for workplace health and safety. The author of this book is a practicing lawyer who uses his knowledge of law cases to highlight how management actions can positively or negatively influence the safety performance of the people who work in an organisation. The author records that having a good safety management system is important, but it is the effective implementation and oversight of this system that determines the workplace culture, and the safety of the workplace, work processes, the people who work for the company and the people who are affected by the services and products of the company.

There are 12 chapters in this book. Each chapter focuses on a particular aspect of safety management and highlights why each factor is important using the findings from accident court case that illustrate the roles and responsibilities of managers and other employees. The information presented clearly shows how each "responsible person's" decisions can affect workplace safety. Accidents analysed include Montara, Deepwater Horizon, BP Texas City, Thomas Bata, The Herald of Free Enterprise, Longford, Piper Alpha, Home insulation, Denbo Pty. Ltd, Triangle Shirtwaist Factory, Hamlet Chicken Processing Plant, Excalibur, Gretley Colliery, Chernobyl, Western Power, Black Hawke 221, CIGC Construction Company, HMAS Westralia, Owens Container Services Australia Pty. Ltd., Active Learning and Leisure Ltd., Space Shuttle Challenger, BP Grangemouth, Moura, and other accidents for which there are court case transcripts. This book includes information related to safety management that is relatively recent as it covers Safety Culture which is a term that was first used in 1987 by the International Nuclear Safety Advisory Group in a post accident review of the Chernobyl nuclear disaster to the beginning of recorded legal requirements to manage workplace safety that were included in law in 1760 BC in the Code of Hammurabi.

This book is different to other workplace health and safety management books that I have read as it takes a case study approach and tells a story, using legal transcripts and findings, to illustrate points related to safety management that are often not realised or forgotten by Chief Executive Officers, but which are very important to managing workplace safety. For people working for companies that wish to be learning organisations this is a good book to read and use. It is written in an interesting style that everyone from Workplace Health and Safety Representatives, to Managers, to Chief Executive Officers can read and learn from. I work as a university educator and have chosen this book to be the textbook for a postgraduate unit of study on accident prevention and safety management as the book "Management obligations for health and safety" covers these topics in enough detail to develop the accident prevention and safety management skills of the next generation of workplace health and safety professionals.

If you would like to purchase (price Australian \$89.95) a copy of it this book can be obtained from Nadine.Raydan@macmillan.com.au or from Boffin Bookshop 806 Hay Street, Perth, Western Australia.

Spinal Cord Injuries: The Impact, Effect and Returning to Work

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Abstract

Spinal Cord Injuries in the workplace cause significant effects on the individual and their family, as well as their employer. The purpose of this article was to research current literature around spinal cord injuries and their effects, as well as the legal obligations of the employee, employer, and insurer for the injured worker returning to work.

Key words: Spinal Cord Injuries. Workers.

Introduction

The construction industry had 17% of all serious workers compensations claims between 2008 and 2009 (Safe Work Australia, 2011). Twelve percent of those claims were fractures and a further 6% resulted in disorders of the spinal vertebrae with the lower back representing majority of these claims (Safe Work Australia, 2011). The total cost of workers' compensation claims for 2005-2006 within Australia was \$57.5 billion (Safe Work Australia, 2009). Of the total claims a third was related to the injury and disease which employers bear 3% of the total cost, injured workers bear 49% of the costs and the community bears 43% of the total cost (Safe Work Australia, 2009). The cost of the injury borne by the injured party should be incentive enough to return to work after an injury.

Returning to work can be difficult for individuals who have suffered a spinal cord injury as the recovery period of the injury, depending on the severity, can take up to a year or even three years for the injured worker to be able to return to work, or the injured person may never return to paid employment (Lim & Tow, 2007). The injured party not only has to deal with the physical effects of the injury but also the psychological affects this injury has on them as well as their family and the company the person works for (Lim and Tow, 2007).

The purpose of this literature review was to research current literature around spinal cord

injuries in the work place and identify the effects this injury has on the individual, their family and the company the person worked for. The second part of this review was to identify the obligations of the employee as well as identifying the barriers that may prevent the injured worker returning to work. This section also discusses the legal obligations the insurer and employer have under the Western Australian (WA) Workers Compensation and Injury Management Act, 1981 towards the employee.

Methodology

To obtain published literature to review for this paper the use of Science Direct Database and Google Scholar was used. Numerous searches were conducted with Science Direct with the search parameters set to 1997 to 2012 with full text journal articles to be identified. The key words used within searches included: spinal injuries and workers compensation; return to work and spinal injury; legal obligations and workers compensation; workers compensation and injury management; employer and spinal injury; workers compensation and back injury. Articles that were identified in the search were reviewed, and relevant articles were obtained and cited within this review.

Further searches for articles were conducted using Google Scholar. The same search parameters were used. Using the advanced search of Google Scholar the following key words were used; spine injuries, effects, workers compensation and spine injury, and the effects

on family members. Useful articles were obtained, reviewed and cited within this review.

Additional research and documentation was obtained to support the journal articles through the Safe Work Australia website publication sections as well as the Workers Compensation and Injury Management Act, and the WA workers compensation legislation documentations in order to understand the obligations of both employees and insurers.

35 publications were reviewed in total and 16 are referenced in this article

Spinal Cord Injuries

Work related injuries within the construction industry are extremely high with 77% of injuries resulting in serious workers compensation claims (Safe Work Australia, 2011). Injuries can occur from numerous avenues and result in a number of injuries including spinal cord injuries, which can result from a fracture in the spine that dislocates the vertebrae (National Institute of Neurological Disorders and Stroke, 2012). The damage begins the moment of injury when displaced bones or fragments bruise or tear into the spinal cord tissue (National Institute of Neurological Disorders and Stroke, 2012). Such an injury can occur on a construction site when a worker falls from a height or material such as a wooden beam falling and landing on the worker's back.

This injury can result in two types of spinal injuries. A complete injury refers to an injury that results in a complete loss of function below the level of a cervical injury referred to as paraplegia or complete quadriplegic. An incomplete spinal injury results in some

sensation and feeling below the point of injury (National Institute of Neurological Disorders and Stroke, 2012). Both types of injuries have significant physical and psychological effects on the individual as well as the family and the employer.

The Effects of Spinal Cord Injuries

Individual

Spinal cord injury (SCI) is a catastrophic injury that suddenly changes a person's life. This injury results in physical changes (depending on the severity of the injury) such as: inability to move and or feel body parts, the loss of control over internal organs functions, and compromised breathing. Although cognitive and intellectual functioning of the individual is not altered, the individual will have psychological, emotional, and social implications that can significantly affect the individual (Vocaturro, 2003).

The physical effects of the SCI are largely dependent on the age of the person injured and the extent of the injury, which both play a role in indicating long term impairments and limitations associated with this injury (Vocaturro, 2003). Some of the long term complications associated with SCI include: loss of bladder and bowel function, spasticity, chronic pain, sexual dysfunction, and variations in blood pressure. Rehabilitation both physical and psychological in the acute phase of the injury is crucial in order to reduce the negative impact of the trauma as well as rehabilitation success. Table 1 identifies how to interpret the stages of grief theory for patients with SCI (Vocaturro, 2003) indicating the importance of accepting the stages of grief. Table 1 identifies the stages of grief for patients with spinal cord injury.

Table 1. Stages of grief (Vocaturro, 2003, p. 106).

TABLE 5-1 Interpretation of Stage of Grief Theory for Patients with Spinal Cord Injury		
Stage	Interpretation for SCI	Function
Denial	Hope of recovery and return to premorbid functioning	Maintain premorbid identity
Anger	Increased awareness; external expression of emotion	Control situation or destiny
Bargaining	Hope of improvement	Maintain motivation for treatment
Depression	Uncertainty of future; defeat	Grieving of losses; preparing for future
Acceptance	Willingness to do things differently	Regain quality of life

As a result of the physical effects an individual may have from this injury, they may also experience and suffer common psychiatric disorders. These can include depression, anxiety disorders including post-traumatic stress disorder and acute stress, as well as substance use disorders and suicide (Lim and Tow, 2007). According to Vocaturo (2003). Depressive symptoms occur in these individuals due to changes in sleep patterns, low self efficacy, dependency on others, financial stress, and helplessness. However, it is further indicated that returning to work and having less worry over finances can improve signs of depression.

Substance abuse is common among SCI due to the medical and psychological implications of the injury and dependency on medication to reduce chronic pain. Patients who are not coping with the injury may also turn to drugs and alcohol as a way of coping and/or emotional numbing. Suicide in SCI patients is also an issue to be wary of as for some patients this is the only option to be free of the pain and psychological disorders (Vocaturo, 2003).

Research by Krause, Saunders and DeVivo (2011) indicates that to improve the motivation, quality of life, and mortality of individuals who have a SCI the economic and financial state of the individual and their family is just as important as the age, sex, race, severity of the injury, and physical implications. Therefore, as indicated and recommended by Meade, Lewis, Jackson and Hess (2004), it is imperative that in the early stages of the rehabilitation of the individual that a vocational rehabilitation goal is set, i.e. return to work program as well as the physical rehabilitation goals. Vocational rehabilitation provides a positive goal for the individual around promoting the expectation of returning to work post injury and can be used as a pull factor to provide meaning and direction to

the individual throughout the process of rehabilitation.

The Family

SCI imposes multiple stresses not only on the individual but also for the family members as one injured family member can affect the whole family system (North, 1999). The impact of the injury on the family members can alter the relationships within the family, and roles within the family may be dramatically changed (North, 1999). These drastic changes in the family roles contribute to stress as spouses may also become sole income earner as well as the caregiver (Vocaturo, 2003). The stress is so prominent due to the caregivers having to learn new domestic roles as well as how to physically care for the injured family members potentially adding strain on the family and marital interaction (Vocaturo, 2003).

North (1999) documents that, in addition to adjustments and stress of the physical disability of the individual, additional emotional factors that the family may feel are associated with injury, including frustration, isolation, guilt, resentment, depressive symptoms, and fatigue. North (1999) continues to report that in addition to the stress and emotional issues associated with SCI, family members also struggle with a wider range of factors such as financial difficulties due to loss of income, as well as rising costs of the injured family member, role reversal, and legal costs (if applicable).

Workers compensation provides some financial relief to the family of the injured individual; however, rehabilitation period of the SCI individual is the most costly due to equipment, attendant care, and medical treatment. Although some or majority of this may be covered, there are still indirect costs related to loss of earnings and productivity, especially if the age of the injured is 30 years old or younger (Krause,

Terza and Dismuke, 2008). An additional long term effect for family members is the type of job and level of income their loved one will be able to return to after they have recovered from the injury. According to Krause (2003), those more likely to return to work after SCI are those who have an education and are qualified to return to work as well as having experience in a professional occupation, as they will most likely return to a job in a professional environment or administration area. However, according to Krause et al (2012), another significant effect SCI can have on family members is the likelihood that the individual may not be able to return to work as for about every three injured individuals only two will be able to return to work successfully.

The family of the injured individual is a crucial element in the recovery of the individual, as research identifies that those individuals who have strong family and social support tend to report less feelings of helplessness and demonstrate greater participation in activities. Therefore, it is very important that family members are included in the rehabilitation plan and are also provided psychological support if needed to help with their added stress and changes within the family (Vocaturro, 2003).

The Employer

The effects to the organization from the injured employee are minimal in relation to the individual and the family members. Some of the direct impact and costs an injured worker has on the employed company is in relation to cost of the insurance company premium rising due to injured worker and the cost of rehabilitation and re-training the worker for other job functions in order for the injured worker to return to the workforce (Injury and Risk Management Western Australia, 2007).

Other indirect costs that affect the employer include: loss of production, experience and knowledge; management time spent investigating the accident; and sourcing and training a temporary employee. Additional effects may be seen in other employees who worked with the injured employee; therefore, counseling services may need to be offered as well as reassuring the other workers of the safety measures and possible retraining in the area of safety (Injury and Risk Management Western Australia 2007). The reputation of the company may also be affected by the employee injury if there is adverse publicity, which can affect possible stakeholder involvement in the company in the future.

Obligations and Problems for Returning to Work

All employers require a return to work program as part of their legal obligations to their injured employees. This program is required to meet the standards and requirements of the Workers Compensation and Injury Management Act as a minimum (Work Cover WA, 2011). As part of this program the injured worker has the opportunity to participate and have input into their return to work program, while the employer needs to take steps to ensure the worker agrees with and complies with this program. With an injured worker returning to work there are certain obligations and barriers they face, as well as problems the employer and the insurer face around a worker returning to work after a spinal cord injury.

Obligations of employee

All employees returning to work have certain obligations they need to fulfill according to Work Cover WA (2011) including:

- The injured party has the right to have a say in their return to work management

plan and to have a union representative present, if required.

- Cooperate and comply with the return to work/injury management plan to the best of their ability.
- Keep in touch with the employer regularly and provide accurate information.
- Notify the insurer if any employment circumstances change and/or if the treating doctor or treatment providers change.
- Attend medical and other treatment appointments arranged by the treating doctor, or where permitted, arranged by the employer.
- Immediately inform the Injury Management personnel in charge of the case if the employee has difficulty carrying out the return to work program.

Employees have a large responsibility around workers compensation and returning to work obligation which are generally explained to them by the insurer or by a workplace injury management coordinator. However, if the employee has serious physical and psychological ramifications from the injury, they may not understand their obligations which could thereby result in legal ramifications around the worker not adhering to his or her legal obligations, resulting in penalties (Workers Compensation and Injury Management Act, 1981).

Barriers for employee returning to work

An individual with an SCI has many barriers that may prevent the individual from complying and returning to work and in following their returning to work program, including:

- Lack of participation in rehabilitation and return to work programs, as well as lack of knowledge and understanding of legal obligations around workers

compensation claims and return to work policies.

- Poor communication and relationship with workplace people and insurer.
- Workers compensation claim is being disputed around health status of injured worker returning to work.
- Level of education achieved and experience in the work force before injury occurred has been known to be a barrier. Studies have indicated that injured individuals with less than high school education had a higher unemployment rate. Further studies indicated that individuals with University degrees had an employment rate of 72% (Hess et al, 2000).
- Gender, race and age can be a possible barrier as those individuals who are young at the occurrence of injury will more likely return to work which increases three years post-injury (Hess et al, 2000). However, employees injured over the age of 50 were significantly less likely to return to work (Krause, Terza & Dismuke, 2008).
- Severity of injury and family support provided has been identified as a barrier. Hess et al (2000) identified those who had marital relationships and strong family support are more likely to return to work than those who had little or no family support.
- Time is a barrier for returning to work. As Krause (2003) states, employment rates improve with increasing time since injury. However 2-3 years out of employment companies may see as a negative, and the individual may have trouble returning to the same organization due to the time spent recovering from their spinal injury.
- Other barriers include physical inability to perform the same type of work post

injury, poor health, stamina and endurance to work, loss of benefits, inaccessibility of the workplace, lack of transportation to get to work and not feeling physically capable of working (Meade et al, 2004).

Problems for the employer

An employer may have the following problems that hinder the employer carrying out their legal obligations.

- Workers compensation claimed is being disputed by insurer, which may result in legal action and additional financial costs.
- Disputes with the insurer and or worker around their obligations imposed in the injury management plan/return to work program written by the insurer
- The retuning to work program employers have identified does not adhere to the legal requirements of the Western Australian Workers Compensation and Injury Management Act 1981 resulting in employer being liable for penalties.
- Not cooperating with the insurer in providing retraining or different job opportunities to the injured worker who is not able to return to their pre-injury job.
- Not engaging in assisting the individual with work place rehabilitation providers if the individual faces barriers in returning to work.
- Financial constraints and limitation around re-training and/or providing additional training for the injured worker.
- Delays or setbacks in the employee's recovery from the injury and repercussions of injury.
- Employer may experience barriers in regards to accommodating an injured

worker, especially if the injured worker in question is in a wheel chair and requires wheel chair access and other altered amenities.

- After the accident occurred in the workplace, the employer may have been forced to implement workplace safety changes as far as reasonable practicable, which maybe an additional cost which the employer cannot afford.
- Worker disagrees with the employer about suitable duties and fitness for work that the employer has provided for the worker (Work Cover NSW, 2010).

Problems for the insurer

For insurers to carry out their legal obligations outlined in the Western Australian Workers Compensation and Injury Management Act 1981, they require employees and employers to adhere to their legal obligations around workers compensation. However insurers may have to deal with potential problems that can prevent them from carrying out their legal obligations. Some of these difficulties may be as follows.

- The employee injury management plan is not being followed by the worker due to disputes in the injury management plan and treatment strategy process.
- Worker disputes their fitness level for returning to work.
- Employer disputes the workers fitness to return to work and level of injury or disability.
- Worker disputes the suitable duties of work provided by the employer.
- Limited and or poor involvement by the employer to provide input into the injury management and return to work program.
- Difficulty with encouraging medical professions to sign off on the workers level of fitness and approval to return to work.

- Poor involvement by the employee around the return to work program.
- Disputes by employer and employee around the claim and level of compensation paid to the employee.
- Employee believing injury was due to work place negligence and therefore filing for common law benefits.
- The return to work program is not up to standards of the code (Work Cover NSW, 2010).

To avoid the problems that may arise for the insurer and employer, all three parties need to communicate effectively to ensure that all parties agree and understand the returning to work program and their legal obligations involved with the employee returning to work.

Conclusions

Spinal Cord Injuries occur in workers within the construction industry. These injuries have the potential to alter the individual's life due to the physical effects, as well as the psychological effects, this injury has on the worker. Spinal cord physical damages can leave the individual as a paraplegic or a quadriplegic resulting in psychological effects such as depression, anxiety disorders as well as an increase in substance use disorders and suicide. The result of this injury

not only has an effect on the individual but the family members of the worker as this injury can put financial and emotional stress on the family members of the injured worker due to loss of income and becoming the primary care taker of the injured worker. An injured worker also has an impact on the employer as it can result in direct costs around increased insurance premiums and indirect costs including loss of production, experience and knowledge as well as sourcing and training a replacement employee.

Returning to work is a key factor that helps promote motivation and rehabilitation for injured workers suffering a spinal cord injury; however, there are certain physical and psychological barriers that the injured worker faces when returning to work as well as certain obligations they are required to follow to avoid facing penalties. The employer and insurer have legal obligations they must adhere to according to the Western Australian Workers Compensation and Injury Management Act 1981 when an employee is returning to work.

This article has reviewed the effects a spinal cord injury has on the individual, their family, and employer, as well as the legal obligations and problems that can arise for the employee, employer, and insurer around the returning to work program.

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