Chain of Survival in Industrial Emergencies and Industrial Disasters

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ABSTRACT

The Chain of Survival in Industrial Emergencies and Disasters is similar to the cardiac arrest chain of survival of the American Heart Association (AHA) and the trauma chain of survival. It is a sequence of five inter-linked rings, which when practiced, decreases the mortality and morbidity in the concerned population. The first ring is Early Prevention, which should be a combined effort of healthcare professionals and industrial authorities. The second ring is Early Recognition. Industrial workers and surrounding communities should be equally trained in hazard and risk analysis along with vulnerability assessment. The third ring is Access to Care by the Early Response System, involving a universal emergency response number and early intervention by on-site trained medical professionals. This ring emphasizes the importance of a link with the surrounding communities, as they are the first responders and the front-line victims. The fourth ring is Early Advanced Care by EMS for transportation to hospitals or by Emergency Department personnel in referral hospitals. The fifth and the last ring is Early Rehabilitation, which includes integrated post emergency care, overall rehabilitation and early return to work. The key to successful implementation of Chain of Survival is to have identified components of care, training and quality monitoring. When practiced diligently, this could help prevent industrial disasters, and mitigate their harmful effects on occurrence.

Key Words: industrial disasters, chain of survival, disaster prevention, disaster mitigation, disasters, early rehabilitation, industrial emergencies

INDUSTRIAL EMERGENCIES AND DISASTERS

Industrial emergencies and disasters can happen either within an industrial facility or when the raw materials or by-products used in these industries are being transported. It could involve small warehouses that store chemicals or big refineries, urban industrial parks or rural mining facilities. They most often spill into the surrounding communities and cause vast damage in terms of life, disability – adjusted life years (DALYs), property, environment, economy etc.[1] These disasters occur with such swiftness and no forewarning for the people involved to even react or respond, thus increasing the number of casualties exponentially. Not only is their acute effect enormous, they do have the propensity to leave behind devastating ramifications on life and the environment for hundreds of years. A great example of such devastating disasters is the Bhopal gas tragedy in 1984, which as of today, is considered the world's worst industrial disaster.[2] 3,000 people were killed instantaneously and 8,000 in the following week. More than half a million people were affected, with more than 38,000 suffering from partial or temporary health concerns and nearly 4,000 suffering from permanent disability.[3] The other deadly industrial disasters to be mentioned and learnt from are the Chernobyl nuclear power plant disaster in 1986, the Halifax explosion in 1917, the Lac Megantic derailment and explosion in 2013 and the Tianjin explosions in 2015. Most of these disasters were a result of accidents, negligence or incompetence. Human error in the form of unsafe behavior, unsafe conditions or a combination of both, is a major attributing factor.[4] As with all disasters, efficient preparedness and mitigation, with effective response and recovery is the key to curb and cull the devastating consequences of industrial emergencies and disasters.

In the wake of so many industrial disasters, the authors are proposing a sequence of five inter-linked rings, which when practiced, decreases the mortality and morbidity rate in the concerned population and surrounding communities. They have termed these links as the Chain of Survival in Industrial Emergencies and Disasters, similar to the AHA's cardiac arrest chain of survival and the trauma chain of survival.[5,6]

The key components or rings of the chain of survival in industrial emergencies and disasters as depicted in Figure 1 are early prevention, early recognition, early response system, early advanced care and early rehabilitation.

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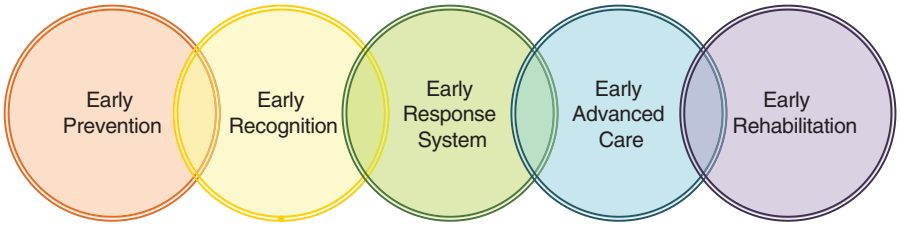
FIGURE 1

Key components in the Chain of Survival in Industrial Emergencies and Disasters.



COMPONENTS OF THE CHAIN OF SURVIVAL

Early Prevention

Prevention is the first and foremost link in the management of any disaster. It is better to prevent a disaster from happening rather than pouring in resources in its aftermath. Though industries are a symbol of economic growth and development, they are a major hazard to the surrounding community and environment, especially in developing countries, where safety regulations are overlooked many times. Without appropriate prevention and preparedness, these hazards can easily escalate to major disasters. Concerned about the chemical safety, particularly in fast-growing economies that are experiencing rapid industrialization, UNEP (United Nations Environment Program) launched an international initiative in 2007 and came up with "A Flexible Framework for addressing Chemical Accident Prevention and Preparedness – A Guidance Document" in 2010.[7] This document can be used by countries worldwide to develop, review or amend their Chemical Accident Prevention Program (CAPP).

Safety Comes First – Infrastructure Safety

Prevention starts even before an industry is set up. It is part of Disaster Risk Reduction (DRR) and hazard mapping. This includes but is not limited to land – use planning, national building regulations, licensing of sites holding hazardous materials and transport routes etc. Industries holding or manufacturing hazardous chemicals should not be located in residential areas. Communities of industry workers should not be allowed to spring up in close vicinity of the industries. A terrible example from the past is the Bhopal incident wherein the plant was located in a crowded working-class informal settlement, leading to many people being engulfed by the toxic fumes, and killed in their sleep.[3,7] Buildings housing hazardous materials should abide by the national building regulations to ensure that they are constructed and operated safely; and that they are not earthquake prone, maintain adequate space and have enough, functional fire exits. They should undergo frequent inspections by a regulating authority to enforce standards and regular license renewal.[8] Sites storing or using hazardous substances should be registered in a national database for hazard mapping. Transportation of hazardous chemicals should follow national regulations or international recommendations issued by the United Nations.[9] Containers should have Material Safety Data Sheet (MSDS) pasted on them, mentioning the chemical contents, the nature of the hazard and actions to be taken in case of a leak or spill to help minimize consequences.

Safety Comes First – Managerial Safety

Industries practicing a Safety Culture and maintaining a healthy work environment would be open to observing a "Safety Moment." A safety moment is a concise talk about specific safety topics relevant to one's workplace, usually conducted at the beginning of a meeting or a shift.[10] Many safety officers vouch for the dictum "I STOP Because I CARE." It is an intervening act aimed at stopping, correcting or spreading awareness on things and actions that can harm people, assets or the environment, irrespective of hierarchy in a company. Developing a safety culture comes from top down, including the senior management officials. Employees should be communicated with about personal safety outcomes and about fostering safety attitudes and beliefs like "speaking about safety wouldn't threaten my job," "if I do speak out, something will be done," "if I don't act, I would be responsible when something happens," "my personal and work mates' safety is more important than money." This information should also be reinforced periodically. Engaging grassroots employees in hazard/risk awareness and assessments helps build ownership, which goes a long way in effective implementation of safety management systems.[11]

Buddy System

The buddy system is a process in which two people, the "buddies," operate together as a single unit for their mutual safety. The buddy system has been used in adventurous activities like Scuba diving and by the Armed Forces by various names – wingmen, battle buddies and shipmates. The main aim is improved safety. Having two people, instead of one, address a hazardous situation is always better. Response is quicker during emergency situations as there is someone looking out for the other. If one were to work alone and meets an

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accident, it could take hours or even days before that person is found. This is also defined by Occupational Safety and Health Administration (OSHA) in their 29-CFR 1910 document.[12]

Guidelines / Protocols and their Strict Adherence

It is very important for guidelines and protocols to be in place. More important is strict adherence to them and the avoidance of complacency. All employees, old and new, should be made aware of these regularly to keep them acquainted and well-trained. Any act or process in an industry with propensity of adverse effects should have checklists and approvals before being undertaken. An example is the ADCO H2S accident in Shah Fields, UAE in February, 2009.[13-15] A foreman and five laborers had gone to fix a valve in a corrosion pit. Work permits were not procured, as it was a small job. The laborer who descended first, collapsed within seconds due to the presence of H2S gas. Not aware of the cause of his collapse, the foreman and another laborer descended to help but collapsed instead. Help was finally called but it was too late, as the three men had lost their lives. The incident could have been averted if not for the complacency in obtaining authorized work permits. It could have been mitigated if personal H2S monitors and breathing apparatuses had been used, or if help had been requested earlier. ADCO had all these guidelines and protocols in place much before the incident.[14,15]

Early Recognition

As told by Robertson Davies, "the eyes see only what the mind is prepared to comprehend."

Identification Tools and Monitors

The health of employees in various industries is potentially at risk through workplace exposure to airborne chemicals and biological agents.[16,17] The exposure could be acute or chronic. The most common mode of exposure is inhalation, though other modes like ingestion and dermal absorption are not uncommon. It is the responsibility of the employers, occupational hygienists and other public health professionals to determine healthy workplaces and adherence to Occupational Exposure Limit (OEL) values of these harmful chemicals.[16] This is facilitated by collecting various samples. Personal sampling involves placing a device in the breathing zone of the employee, usually attached to the lapel. Area sampling involves positioning a device in the general area of the employee and/or operation of concern. This can show the spread of contaminants or indicate when entry to an area may be considered safe. Source samples are taken adjacent to the source of the hazardous substance and are used to determine the effectiveness of controls or containment. Surface sampling is done to provide information on settled contaminants that may be deposited.[18] This sampling can be done through real time monitoring and biomonitoring.[18,19]

Education and Training

Nowadays, almost all industries are focusing on training their employees in specific skill-sets and maintaining their own talent pool, rather than recruiting new ones. This not only decreases the cost, but also contributes to enrichment of the employee-employer relationship, and incentivizes the employees to keep their jobs. Continuous education and repeated training like frequent drills are the stepping stones towards the goal of effective performance at the workplace. It requires active pursuit of the knowledge and skills needed to participate in a constantly changing workplace. It not only boosts confidence of the employees, but also opens their minds to come up with innovative solutions. It helps in deeper understanding of their working situation. Frequent drills are a kinesthetic way of learning,[20] wherein people are able to relate to and remember information much more easily when performing the activity itself and by role playing.

Community Vigilance and Training

Community awareness, vigilance, and training are important aspects of Community Based Disaster Risk Reduction (CBDRR). The United Nations Environment Program (UNEP) brings all these components together in its Awareness and Preparedness for Emergencies at Local Level (APELL) program initiative.[21] It is a ten-element process involving partnership between local authorities, surrounding population and the industry itself in creating awareness of the hazards and risks, assessing the vulnerabilities and capacities and further cohesively coming up with ways of bridging the gaps. APELL has been successfully implemented in over 30 countries worldwide and openly adapted by various industry partners and international corporations.[22] Initially, it was started for natural disasters involving coastal communities, but soon spread to industrial emergencies and disasters as well.

Early Response System

Once the disaster has been recognized, early response and recovery are keys, for effectively curtailing the impact of the disaster.

Universal Number

Hospitals often use code names or sirens to alert their staff in emergencies. Whoever calls a code usually has a dedicated number to dial and never gets stuck waiting in the phone line. These codes can be communicated through an intercom system or directly to staff using other communication devices likes pagers.[23] This system of communication can be adopted in industrial settings to alert personnel of any emergencies or disasters. The method of communication could either be a public address system or through walkie-talkies. It allows trained personnel to respond quickly and appropriately.

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FIGURE 2

METHANE report for reporting disasters concisely.

The **METHANE** report

M – Major incident
E – Exact location
T – Type of incident
H – Hazards present and anticipated
A – Access routes
N – Number and type of injuries and casualties
E – Emergency services present and required

Local Medical Units

Local medical units within the industries should be resourced around the clock by adequately trained personnel. All medical and non-medical staff should be trained in basic life support and some form of industrial disaster management programs. The medical professionals should mandatorily be trained in ACLS and ATLS. All employees including security guards and safety officers should be certified by organizations like OSHA and NIOSH, both of which aim to provide safe working environments by indulging in research, setting and enforcing standards and by providing training, outreach, education and assistance.[24,25] These trainings should not only be at employee induction time, but at regular intervals with updates on policies and protocols.

Cordoning off and Evacuation

Once a disaster has been recognized, early cordoning off of the area and prompt evacuation of the personnel involved where the situation demands, helps in not setting off the domino effect or cascading effect of most industrial disasters. A domino effect is defined as the occurrence of a cascading chain of events when the fire, explosion, missile projection, etc., generated by an accident in one process unit causes secondary accidents in other units.[26] It is a likely scenario in many major industrial plants and has the potential for catastrophic consequences, which are much more than those from the primary incident alone. Cordoning off and evacuation thus helps in mitigating the effects of a disaster to a certain extent.

Good Communication Channels

Early response includes prompt and accurate communication of the incident to the concerned authorities – both within the industry and outside. Employees and first responders should be trained in giving concise report of the incident. An example of reporting in a concise format is by the use of the acronym "METHANE" mentioned in Figure 2. METHANE is now a recognized model for sharing incident information in a consistent way, quickly and easily between various emergency providers. It has been used widely by many emergency service providers worldwide. This sort of communication helps in getting the desired and tactful help early in time. There could be automated warning sirens in places storing or working with hazardous materials which can go off in cases of toxic concentrations, presence of fires or leak of hazardous substances. This helps in warning the personnel close by, of the impending disaster and helps in cordoning off and facilitating evacuation. Communication should also be promptly sent to the surrounding communities for evacuation and other off-site agencies like fire services, HAZMAT team, local emergency response services and nearby hospitals. The success of communication channels between these agencies during an incident, relies majorly on consistent ground work by building relationships and by regular combined drills and collaborative trainings.

Community Response and Resilience

Most of the industrial emergencies and disasters spill over the fence and involve the surrounding communities. These communities become the victims as well as the front-line first responders till formal help arrives. Thus, involving them in disaster mitigation, preparedness and response is of paramount importance. Community empowerment and Community Based Disaster Management (CBDM) programs are being conducted in vulnerable communities with respect to natural disasters to build community resilience.[27] Similar programs can be adopted for Industrial Emergencies and Disasters as well, an example being UNEP's APELL program.[21] These programs include but are not limited to raising public awareness of the hazards the industry might have, developing reliable and effective warning systems, developing and putting plans in place in case of untoward incidents, involving the community actively in risk identification, risk stratification, response management and early evacuation. This would help not only with good collaboration between the industry and the surrounding community, but would also reduce their vulnerabilities and enhance their capacities to tackle future disasters.

Early Advanced Care

Early advanced care forms an important link in the Chain of Survival of Industrial Emergencies and Disasters. This includes early transport of the injured by trained personnel to definitive care, keeping in mind the HAZMAT precautionary measures.

Early EMS

Transportation of the injured to definitive care is as paramount as rescuing them from the disaster site. This should be done by personnel trained in HAZMAT and basic emergency management and those who are aware of the secondary injuries that these victims can sustain.[28] In the authors' opinion, it is ideal for on-site medical posts or clinics to have at least one functional ambulance on standby all the time to transport the wounded. In case of mass casualty incidents, this ambulance and its personnel can act as the triaging unit. The industrial

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units should have direct contacts with pre-informed local ambulance and rescue services that can be buzzed into action in times of need.

Early Definitive Care

All industrial units should have a list of surrounding hospitals, equipped to handle victims of industrial disasters and their emergency contact numbers. This should be updated and displayed or kept in a place accessible to all employees in times of need. Unit heads should arrange regular meetings with the hospital administration to chalk out joint action plans and have pre-written response and recovery procedures in place, in case of an event. Joint trainings with the hospital staff should be conducted annually to make both the parties aware of these protocols and procedures. Hospital staff should be trained in noticing red flags in victims of industrial disasters, both acute and chronic, and take appropriate preventive and corrective measures. Examples can be learnt from the Bhopal gas tragedy in 1984,[3,7] where the immediate medical responders did not have a clue about the composition of the gas causing the symptoms and its antidote. They weren't given the details even on calling the industrial unit. Another example is the Tokyo subway sarin gas attack in 1995,[29,30] in which the first responders and healthcare professionals attending to victims suffered from secondary exposures as they did not know the composition of the agent.[31]

Early Rehabilitation

Rehabilitation and Return to Work (RTW)

Rehabilitation is not only physical as construed by many, but it involves psychological, social, and vocational aspects as well. According to the New South Wales Department of Industrial Relations and Employment, Occupational Rehabilitation is defined as "the restoration of injured workers to the fullest physical, psychological, social, vocational and economic usefulness of which they are capable."[32] The aim of a rehabilitation and RTW program is not only to help an injured employee maintain or improve the performance of activities of daily living, but also assist him/her to be maintained within the workplace or return them to appropriate employment in a timely, safe and cost efficient manner. This involves a tailored program in consultation with his/her medical practitioner while considering the existing skills, experience and capabilities of the employee to find a suitable job. The employees' apprehension around returning to the same working environment should be addressed with psychological support, peer support wherever possible, and vocational training. Research shows that rehabilitation at the workplace and peer support from colleagues goes a long way in early recovery and early return to work.[33,34]

Retraining

A major part of early rehabilitation is retraining. Retraining should be done to incorporate the injured employee into his/her pre-injury duties and responsibilities, provided his physical condition and capabilities allow him to do so. This should be done in accordance with the medical practitioner involved in the rehabilitation process. If the injured employee is not able to return to pre-injury duties, then his/her supervisor, along with the rehabilitation officer should devise a suitable duty plan for him/her. All efforts should be made to retain the injured employee within the system. Retraining and re-induction should be done promptly and not overlooked, howsoever experienced the injured employee might be.[34] This includes training on safety protocols, appropriate measures to be taken in case of disasters, and learning from past mistakes. Instead of being looked down upon and harassed by fellow co-workers, the injured employee should be encouraged to verbalize their mistakes, and the obstacles that they have overcome, to get back to work and be an inspiration for the rest.

CONCLUSION

The authors propose that all industries, big or small, should incorporate the key components of The Chain of Survival in Industrial Emergencies and Disasters into their SOPs and training program of their employees. When practiced diligently, this would help in preventing the industrial disasters from happening, constitute an effective response and mitigate their harmful effects on occurrence.

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Conflict of Interest Statement

The authors have no conflicts of interest to declare.

REFERENCES

1. The University of Iowa Center for Human Rights (UICHR). *Human Right Index: Industrial Disasters*. No 31. https://tlcp.law.uiowa.edu/human-rights-index-31-industrial-disasters. Accessed April 12, 2019.
2. Mandavilli A. The World's Worst Industrial Disaster is Still Unfolding. https://www.theatlantic.com/science/archive/2018/07/the-worlds-worst-industrial-disaster-is-still-unfolding/560726/. Accessed February 10, 2019.
3. Wikipedia. Bhopal Disaster or Bhopal Gas Tragedy. https://en.wikipedia.org/wiki/Bhopal_disaster. Accessed May 4, 2018.
4. Stephen VM Jr. Industrial Accidents – Why do they occur? Are they inevitable? *OH&S*. 2006. https://ohsonline.com/Articles/2006/07/Industrial-Accidents.aspx?Page=1. Accessed April 26, 2019.
5. American Heart Association. Out-of-hospital Chain of Survival. https://cpr.heart.org/AHAECC/CPRAndECC/AboutCPRFirstAid/CPRFactsAndStats/UCM_475731_Out-of-hospital-Chain-of-Survival.jsp. Accessed March 7, 2018.
6. Bakke HK, Wisborg T. The trauma chain of survival - Each link is equally important (but some links are more equal than others). *Injury*. 2017; 48(5):975-977. doi: 10.1016/j.injury.2017.04.001.

https://doi.org/10.1017/dmp.2020.165 Published online by Cambridge University Press

7. United Nations Environment Program (UNEP). *A Flexible Framework for Addressing Chemical Accident Prevention and Preparedness - A Guidance Document*. 2013. https://reliefweb.int/report/world/flexible-framework-addressing-chemical-accident-prevention-and-preparedness. Accessed November 28, 2019.
8. World Health Organization. *Manual for the Public Health Management of Chemical Incidents*. 2009. https://www.who.int/publications-detail/who-manual-for-the-public-health-management-of-chemical-incidents. Accessed November 15, 2019.
9. United Nations. Recommendations on the Transport of Dangerous Goods, UN Model Regulations. 17th revised edition. United Nations Publications, 2011. https://www.unece.org/fileadmin/DAM/trans/danger/publi/unrec/rev17/English/Rev17_Volume1.pdf. Accessed November 20th, 2019.
10. Brun J. What is a Safety Moment? 2015. https://nimonik.com/2015/03/francais-what-is-a-safety-moment/. Accessed May 15, 2018.
11. Queensland Department of Justice. *Understanding Safety Culture*. 2013. https://www.worksafe.qld.gov.au/__data/assets/pdf_file/0004/82705/understanding-safety-culture.pdf. Accessed December 1, 2019.
12. Occupational Safety and Health Administration (OSHA). OSHA Laws & Regulations; Regulations (Standards – 29 CFR). https://www.osha.gov/pls/oshaweb/owastand.display_standard_group?p_toc_level=1&p_part_number=1910. Accessed June 6, 2018.
13. Gangal N. Accident at UAE's Shah Oilfield kills three. *Arabian Business*. 2009. https://www.arabianbusiness.com/accident-at-uae-s-shah-oilfield-kills-three-report-80394.html. Accessed February 23, 2018.
14. Hossain A. H2S Accident video at Shah Oilfield. Published August 5, 2013. https://www.youtube.com/watch?v=du23OTxNLSg. Accessed February 23, 2018.
15. Al Kindy AMS. H2S Workshop "Silent Killer", ADCO. 2009. http://www.authorstream.com/Presentation/aSGuest119535-1250935-adco-h2s-fatalities/. Accessed March 17, 2018.
16. Hathaway GJ, Proctor NH. *Chapter 2 on Chemical Hazards*. In: Chemical Hazards of the Workplace. 5th ed. Wiley; 2005. doi: 10.1002/0471662666.
17. Raymond A. Patty's Industrial Hygiene. *Occup Med (Lond)*. 2012; 62(1):69-70. https://doi.org/10.1093/occmed/kqr162.
18. CPWR. Chapter 4: Monitoring and Sampling. In: CPWR 40-Hour Hazardous Waste Worker: Participant Manual. Version VIII. Published June 2016. https://www.cpwr.com/wp-content/uploads/publications/CPWR-2016-HW-Participant-Manual-Complete.pdf. Accessed December 23, 2019.
19. Náray M, Kudász F. Biological monitoring (biomonitoring). Hungarian Institute of Occupational Health. https://oshwiki.eu/wiki/Biological_monitoring_(biomonitoring). Accessed December 23,2019.
20. Cheney R. *Kinesthetic Teaching Strategies for Adults in a Lecture Setting* [Honors Senior Theses/Projects 121]. Western Oregon University. https://digitalcommons.wou.edu/honors_theses/121. Accessed December 23, 2019.
21. United Nations Environment Program. *UNEP APELL Handbook: A Process for Improving Community Awareness and Preparedness for Technological Hazards and Environmental Emergencies:* 2015. 2nd ed. https://www.sia-toolbox.net/file/unep-apell-handbook-2015pdf. Accessed December 24, 2019.
22. United Nations Environment Program. Awareness and Preparedness for Emergencies at Local Level (APELL) Partnerships. https://www.unenvironment.org/explore-topics/disasters-conflicts/what-we-do/preparedness-and-response/awareness-and-preparedness. Accessed December 20, 2019.
23. Dix M, Falck S. Code Blue, Code Red, Code Black: Definition of Hospital Color Codes. https://www.healthline.com/health/code-blue. Accessed September 15, 2018.
24. Occupational Safety and Health Administration (OSHA). Occupational Safety and Health Administration. https://www.osha.gov/aboutosha. Accessed August 25, 2019.
25. The National Institute of Occupational Safety and Health (NIOSH). The National Institute of Occupational Safety & Health. https://www.cdc.gov/niosh/about/default.html. Accessed August 25, 2019.
26. Khan FI, Abbasi SA. Major Accidents in Process Industries and An Analysis of Causes and Consequences. *JLPPI*. 2001;12(5):361-378. DOI: 10.1016/S0950-4230(98)00062-X.
27. Pandey BH, Okazaki K. Community-based disaster management: Empowering communities to cope with disaster risks. *Reg Dev Dialogue*. 2005;26(2):52. https://pdfs.semanticscholar.org/b76c/55e5d2b32d900aa765e4aefe01540ba6cffa.pdf. Accessed August 28, 2019.
28. Pollak AN, Gupton CL. American Academy of Orthopaedic Surgeons. *Emergency Care and Transportation of the Sick and Injured*. 8th ed. Sudbury, MA: Jones and Bartlett; 2002.
29. Wikipedia. Tokyo Subway Sarin Attack (Subway Sarin Incident) 1995. https://en.wikipedia.org/wiki/Tokyo_subway_sarin_attack#Aftermath. Accessed September 20, 2018.
30. Okumura T, Suzuki K, Fukuda A, Kohama A, Takasu N, Ishimatsu S, Hinohara S. The Tokyo subway sarin attack: Disaster Management, Part 1: Community emergency response. *J Acad Emerg Med*. 1998;5(6): 613–7. doi: 10.1111/j.1553-2712.1998.tb02470.x
31. Ishimatsu S, Takasu N. Tokyo chikatetsu sarin jiken: Seiroka kokusai byoin no shinryo katsudo (The Tokyo Subway Sarin Incident: Emergency Medical Response by St. Luke's International Hospital). *Kyukyu igaku (Emergency Medicine)*. 1995;165-171.
32. New South Wales Government NSW. *Workplace Injury Management and Workers Compensation Act: 1998*. No 86. New South Wales (NSW) Government. https://www.legislation.nsw.gov.au/#/view/act/1998/86/full. Accessed April 20, 2019.
33. Cancelliere C, Donovan J, Stochkendahl MJ, Biscardi M, Ammendolia C, Myburgh C, Cassidy JD. Factors Affecting Return to Work After Injury or Illness: Best Evidence Synthesis of Systematic Reviews. *Chir Man Therap*. 2016;24:32. doi: 10.1186/s12998-016-0113-z.
34. New South Wales (NSW) Government Health. *Injury Management and Return to Work Policy Directive*. 2013. https://www1.health.nsw.gov.au/pds/ActivePDSDocuments/PD2013_006.pdf. Accessed April 20, 2019.

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