An Overview of Leveraging Workers’ Compensation Rights Based from Biological Infections

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Abstract
The workers’ compensation firm offers reasonable compensation to its beneficiary members when it comes to occupational disease. While common occupational-related injuries are visually justifiable, many illnesses influenced by biological hazard are difficult to predict as it takes years for the disease to develop, depending on the individual immune system. The occupational disease that consists of physical injury and microbial infection were rising in the past decades. This paper discoursed a winding microbial infection from direct contact and prolonged condition, which both are originated from physical injuries. In principle, the complexity to extenuate microbial pathogenicity usually hamper compensation claims; as it faced various challenges and condition to meet its requirement. We included several legal opinions that support compensation benefits, in hope to leverage a hopeful transition of compensation rights of trained workers such as paramedic, researcher, frontlines, customer services, and other biological-risk industry workforces.

Keywords: Microbiology; Compensation; SOCSO; Malaysia; Disease

1 Introduction
Humans are vulnerable to ordinary disease of life in which involves microbial infections. These sorts of diseases are usually occurring outside the scope of employment. Therefore, it is not entitled to receive compensation benefits. Efforts to distinguish occupational injuries and ordinary diseases remain difficult as it involves comprehensive research to assess microbial pathogenesis inside the human body and how it relates to occupational diseases. In addition, the degree of infection is usually reflected in host immunological strength; a discreet system that reacts to foreign body invasions inside the body. It may occur in later time after the occupational-based incident. When the injuries are classified occupational, the injury date will be recorded. The injury date is not only recorded to observe the first symptom appearance, but it also represents and recognizes nature, work-relatedness, and severity of the disease. Therefore, the date of injury is essential as part of determining the factor of the workers’ compensation insurance carrier is liable to offer such compensations. The employer, who employs the employee upon the injury recorded is the considered the true employer. In brief description, the worker has worked with several employers over period, had exposed to similar occupational disease with no distinct manifestation throughout employment. Therefore, the insurance company from his/her last employer is liable to compensate the worker that exposed to the causes of the disease (24).

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Such regulation creates a perturbing perception towards employees in the medical profession such as, doctors, nurses, medical assistant and other medical professionals throughout the country; in which, certainly exposed to the “ordinary disease of life”. The claimant’s attorneys keep emphasizing to its client that not all disease are ordinary diseases of life. In fact, some diseases fall in occupational disease categories. In the eyes of law, segregation in occupational disease classification reduces any windfall of claims from the employee who contract illnesses that are common in everyday life. The objective of this overview is recreating awareness of microbial infection in occupational disease; specifically, in Malaysia. The outcome of this overview will create a better platform to extenuate microbial relation in occupational injuries without jeopardizing compensation benefits.

2 The Human Immune System

A human immune system plays an important role to protect its bodily system from a pathogenic microbiome invasion. Such a complex system is constantly available and amplifies its strength wherever a foreign object invades the human tissues. However, every human is born with a deviate immunocompromised condition; – A weakened immune system that compromised body effectiveness to combat infection. It is usually occurring on an individual with diabetes, AIDS, cancer, and malnutrition. It is asymptomatic and silently degrades the overall body defenses until a certain period of time.

In some circumstances, the immune system is intentionally suppressed by consuming an immunosuppressed drug (e.g. Tacrolimus and Humira) to allow effective treatment. For example, in chemotherapy (for cancer treatment), organ transplant, or viral treatment such as; Shingles, SLE, Hepatitis
ions of mechanical trauma. In this case, a 52-year-old female who works as a cleaner is brought to medical attention following her continuous exposure to cleaning chemicals splash. Investigators found that this case is related to work.

In the eyes of the public, the verdicts on her compensation case seem injustice, as her rights to receive such compensation were denied. In our personal views, her initial symptoms may be final. The medical board team declares that she is clinically blind and kept her case appealing. The appellate board’s decision will be final. The compensation application was rejected. The decision to reject her application was conveyed to her after the initial reports in 2011. Her compensation application was rejected. The medical board team discover that she was suffering from Herpes Zoster Ophthalmicus (HZO), a form of shingles bac-

2.1 Microbial Transmission Route based from Occupational Injury

A microbacterium has existed on the earth for billions of years. Numerous amounts of its species were a dynamic key player in the natural ecological system by regulating biogeochemical cycle for its sustainability (9). Therefore, a microbacterium has certain ability to survive in a normal or a thriving environment. For instance, several microbes were successfully cultivated from a high pressure, salinity, temperature, concentration, and vice versa (19, 15).

The microorganism may invade human in several ways. The common transmission route is inhalation, where the airborne-type microbe gets inhaled into the respiratory system. The second common route is ingestion (from contaminated hand and food), followed by direct contact from an open wound, and invasion of insects/animal bite that breaks the skin barrier; allowing entry of pathogens. Upon entry, it perceives the local environment and transmits the signals to its molecular signal, so it can determine the needs to surge its predatory skills and permit cell modifications to protect itself if needed.

![Illustration of common open wound and healing process](Image courtesy of MeteoWeb.eu)

Figure 1: Illustration of common open wound and healing process

An occupational injury is usually determined by a mechanical trauma; an injury to any portion in the body that is visible to the naked eyes such as; a blow, crush, cut, or penetrating wound. Bone fracture, hemorrhage, and infections are the usual complications of mechanical trauma. In this review, we are focusing on how the microorganism invades the host based on an open wound. Naturally, a small form of open wound (as depicted in Figure 1) can be healed with the aid of the body immune system and coagulation factor; A recent research indicates that healing rates correspond with the immune system and coagulation factor; stimulated by the Hsp60 protein (20, 14). This protein denotes its role in the genesis of inflammation and promotes the correct folding of other proteins; concentrated in a topical gel and applied to the skin, speeds up scarring and tissue regeneration. The faster the healing rate, the chances of a microorganism to enter the open wound are slimmer.

Certain microorganisms are commensal human microbiota; brings mutual benefit when residing on or within human bodily fluid and tissues (e.g Lactobacillus genera (gut), Actinomyces (oral cavity), and Staphylococcus aureus (on the skin)). Others may get transmitted from contaminated food, water, inhalation, body openings, and open wound. In certain circumstances, a commensal microbiota may become a pathobiont. For instance, Staphylococcus aureus along with similar symbiotic species can cause disease if they begin to take over the tissues they have colonized or invaded other tissues. After 72 hours, it can take hold in human tissues and eventually become resistant to treatment; famously known as Methicillin-Resistant Staphylococcus aureus (MRSA).

In general, occupational injury can be examined visually such as; type of wound, fractures, blood loss, dehydration, and temperature-related stroke. However, an infection ailment cannot be determined based on visual. An early symptom may not straight away indicate it is a such and such disease. It may demonstrate a harmless symptom such as fever, flu, and physical pain. Upon uninterrupted duplication or tissue breaches, invaded microbiome may have overtaken the most essential tissue; the brain. It is usually considered the severe stage of infection where it can cause permanent disability or death.

2.2 Challenges of claims compensation due to unforeseen history

This report below was excerpted from the FreeMalaysiaToday, (2017) websites. Ally (real name is undisclosed), a 52 years old female who works as a cleaner is becoming clinically blind from an occupational hazard. Her initial reports in 2011 denote that she had applied for a compensation from the Temporary Disablement Benefit scheme when she experiences pain in her right eye, suffering hair loss, and a peeled skin on the forehead. Following the inquiry, SOCSO had advised her to submit a Notice of Occupational Disease (NOD) together with the medical report from a reputable medical center. As she claimed her blindness is due to cleaning chemicals splash, investigators found that none of her co-workers experienced the same problem.

SOCSO reveals that they take three years to receive her NOD submission and medical report. As her case was referred to the SOCSO’s Medical Board, her injury is not verified as an occupational disease as defined under Section 28 of the Employees’ Social Security Act. Moreover, the SOCSO’s medical board team discover that she was suffering from Herpes Zoster Ophthalmicus (HZO), a form of shingles back in 2011. Her compensation application was rejected. The decision to reject her application was conveyed to her after the Medical Board review. In 2015, The SOCSO medical board team declares that she is clinically blind and kept her case under review following her continuous re-appealing. The SOCSO’s has received her appeal and referred her cases to the Appellate Medical Board. The appellate board’s decision will be final.

In the eyes of the public, the verdicts on her compensation case seem injustice, as her rights to receive such compensation was denied. In our personal views, her initial symptoms may associate with chemical hazards. However, it is unclear that her injury is related to work.
Given the fact that she is suffering from Herpes-Zoster Ophthalmicus (HZO), we unable to predict if she had contracted with the Varicella-zoster virus (VZV) (a virus that caused HZO) on the same year she filed for compensation. There is a possibility that VZV inhibited unnoticedly inside her body for years. Based on previous studies, VZV affects children worldwide. But it occurrences can be so mild that it is unnoticed. There are 300,000 to 500,000 individuals are affected by shingles each year and 95% of adults in the United States have antibodies to VZV. If acquired in infancy, or adulthood or by an immunocompromised person, the infection can be fatal. If it is reactivated in the elderly years, vesicular rash or shingles can be seen (1).

Based on the above cases, it is unknown if Alby was vaccinated with the anti-VZV vaccine. It can be assumed that she was immunocompromised; as she experiences keratitis. Another speculation that seems important to investigate is, does she contracted with the VZV transmitted from chicken pox patient, unvaccinated individual, or else?

### 3 Challenges of Associating Infection with Occupational Disease

To be covered under SOCSO, a sick employee must demonstrate that their current illness has resulted directly from conditions of their employment, and in excessive exposure rate, compared to a normal environment. These unique exposures usually occur in the medical profession such as - Doctors, nurses, paramedics, and other medical professionals throughout global because they are certainly at risk of high exposure to the “ordinary diseases of life.” Other than medical professionals, the veterinarians, military, forestry worker, miner, farmers workers and refuse workers also have the risk of occupational infection.

While opting for compensation, the Claimant’s attorneys sternly remind us that not all diseases are the ordinary diseases of life. Some diseases are instead, occupational disease. When the injury is occupational, the date of this injury should be the date that the employee knew that the disease strongly related to the employment. This date is not necessarily the date that first symptoms have appeared. But it is the date that a reasonable person recognizes the diseases' nature, seriousness, and work-relatedness (24).

If an injury is indeed an occupational disease, the employer in whose employs the affected employee, is the valid employer. The date of injury is also important to determine the workers' compensation insurance carriers. It must be liable to compensate occupational disease. If the employee has worked for several employers over a period of time and is exposed to similar occupational disease throughout his/her employment with no distinct manifestation of the disease, the last employers' insurance company that insured their occupational-based injury are liable for compensations (24).

Many infections are associated with occupations. A person with certain occupation and intriguing lifestyle criteria’s has a higher risk to contract certain infections. The link between the infection and the workplace are often missed by the attending physician due to a lack of awareness. Sometimes, the prognosis is difficult to construe without the use of sophisticated molecular epidemiological tests (e.g. mRNA). For instance, pathogens reported to be associated with closely related infectious diseases outcome in a matrix of occupational groups and exposure pathways allowed the reliable exposure hazards identification for specific occupational groups beyond currently reported diseases (13, 2). Therefore, an adequate preventive measure is needed to achieve diagnostic accuracy and helping the patient to secure their SOCSO monetary compensations (18).

### 4 Emerging og Exotic and Non-Communicable Disease in Malaysia Perspective

#### 4.1 Exotic Diseases in Malaysia

Malaysia is tropically hot and humid terrain opposes some of the unique exotic diseases. Many of infectious recorded are specifically occurs only in such conditions. Based on Table 1, several occupational infections occur in Malaysia are classified as zoonosis; originated from infected animals etc. Malaysia has a constant Dengue fever cases every year (26). In past three years, Rabies (6), Malaria (11) and Leptospirosis (21) cases were reported. For instance, the Leptospirosis infection is steadily increased from 2,268 cases (2011) to 8,291 (2015) and,

<table>
<thead>
<tr>
<th>Worker</th>
<th>Disease</th>
<th>Agent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health Worker</td>
<td>AIDS, Hepatitis, Tuberculosis, SARS</td>
<td>HIV, Hepatitis B, Mycobacterium tuberculosis, H1N1 (Avian flu)</td>
</tr>
<tr>
<td>Veterans, farm workers</td>
<td>Salmonella infections, leptospirosis, Rabies, Anthrax, Schistosomiasis</td>
<td>Salmonella typhi, Salmonella paratyphi, Lyssaviruses, Bacillus anthracis, Schistosoma mansoni, Trichinella spiralis, Nipah virus, Cossiella bruneti (sheep, goats, cattle), Streptococcus suis (pigs), Hantaviruses, Hepatitis A, Leptospirosis, Borrelia burgdorferi (deer tick), Lyssaviruses (Lyssa bat), Yersenia pestis Histoplasma capsulatum (fungus in birds droppings)</td>
</tr>
<tr>
<td>Abattoir</td>
<td>Nipah Virus infection (NiV), Trichinosis, Q fever</td>
<td>Trichinella spiralis, Nipah virus, Cossiella bruneti (sheep, goats, cattle), Streptococcus suis (pigs), Hantaviruses, Hepatitis A, Leptospirosis, Borrelia burgdorferi (deer tick), Lyssaviruses (Lyssa bat), Yersenia pestis Histoplasma capsulatum (fungus in birds droppings)</td>
</tr>
<tr>
<td>Sewer Worker</td>
<td>Hepatitis, Leptospirosis</td>
<td>Usually involves Mycobacterium tuberculosis, Burkholderia pseudomallei, Schistosomes sp.</td>
</tr>
<tr>
<td>Forest ranger / worker</td>
<td>Lyme disease, rabies, Black plague</td>
<td>Yersenia pestis, Bacillus anthracis</td>
</tr>
<tr>
<td>Construction Worker</td>
<td>Histoplasmosis</td>
<td></td>
</tr>
<tr>
<td>Miners, Sandblaster, grinders, quarry workers etc.</td>
<td>Silicotuberculosis</td>
<td></td>
</tr>
<tr>
<td>Rice farmers</td>
<td>Melioidosis, Cercarial dermatitis (“sawah itch”)</td>
<td></td>
</tr>
<tr>
<td>Military Personnel</td>
<td>Biological warfare agents; Anthrax, smallpox, Black plague</td>
<td></td>
</tr>
</tbody>
</table>

* Infected animals (vector)

Table 1: Workers with risk of occupational infections. Adapted from (18)
falling to 5,284 in 2016. For the past decade, Malaysia was affected with H1N1, SARS (10), Japanese Encephalitis (16); pandemic diseases that transmitted zoonotically (birds, mosquitoes, horses, pigs etc.)

The Malaysian health authorities have raised concerns over an infectious diseases’ comeback namely, tuberculosis (TB), leptospirosis and rabies. These diseases were once virtually eradicated in the country. Based on the Health Ministry statistics, there were 25,739 cases with TB reported in 2016, of which 1,945 patients died, a 14.7% annual increase, compared to 1,696 deaths recorded among 24,220 TB cases in 2015. The Former director of the Institute of Respiratory Medicine, Mr. Abdul Razak Muttalif, express his concern over the upstretched TB cases in mid-1990, although TB cases were dropped significantly from 30,000 (in 1960) to less than 6,000 cases in the mid-1980s. Razak attributed the comeback to delay in diagnosis and treatment, which has led to disease spreading, adding that more cases are being detected because more people were screened. In the case of dengue fever, there were 237 fatalities out of 101,357 cases last year, down from 336 deaths out of 120,836 cases in 2015 (25, 3). Additionally, there is a hype arises over sudden emergence of Nipah virus (NiV) in many tropical countries. As 2018 reaches the end, there is no vaccine ever produced to treat this disease (22).

Astonishingly, NiV were originated from Nipah River, Malaysia. However, its outbreaks are somewhat isolated, deep in the forest reserves, and mainly contribute by fruit bats and pigs (8, 23). Until May 2018, the NiV infection reaches 700 cases and the fatality rate is between 50-75 percent (5, 8). Based on Table 1 depicted above, the forest ranger, abattoir, researcher, military officer, and veterinarians were vulnerable from contracting with NiV.

4.2 Non-Communicable Disease (NCD)

The World Health Organisation (WHO) defines NCDs or chronic diseases as diseases that are not transmitted from person to person. The top NCDs that reported in Malaysia are the Cardiovascular diseases (CVD), diabetes, hypertension, cancer and asthma (4). These diseases are a major cause of death among employees under the age of 60 (> 6,500 cases in 2016) and 73% of workers aged 40 and above, are overweight or obese. Whereas, 62% have high or borderline cholesterol levels. Based on survey and free health screening conducted by SOCSO, 66% or 460,000 Malaysia workers over 40 years old never opt for a suitable medical screening.

After free medical screening was completed, SOCSO found that 9% of workers above 40 years old are diabetic, 20% are hypertensive, and 21% are pre-hypertensive (Azhar, 2017). In addition, it is projected that 4% of all employees were at high risk of developing cardiac-related diseases in 10 years to come. (Azhar, 2017; 4). These alarming statistics caused galvanize reactions to every OSH stakeholder. A greater number of accidents and deaths means higher total compensation to be paid by SOCSO to workers or their dependents; by providing temporary or permanent disabilities, or death, through Temporary Disablement Benefit, Permanent Disablement Benefit, Invalidity Scheme or Survivors’ Pension. Therefore, all participated parties should find ways to address such issue as Malaysia cannot afford to lose valuable human resources to industrial and road accidents, or diseases (17).

For the past five years, the compensation paid out due to NCDs had surged by 50%. In 2016, the estimated value of compensation was RM731 million. Quoting the statement from the SOCSO’s Chief Executive Officer, Dr. Mohammed Azman Aziz Mohammed:

- “If the uptrend continues, the SOCSO fund will be depleted. And the way we are going, this will happen soon,”

Hence, by 2030, NCDs would cost the nation a 5% loss in GDP (US$30 billion or RM133 billion). A never-ending NCD case might hinder future collaborations between the researcher (infectious disease) and SOCSO. Colossal grants are needed to commence the assessment of infection epidemiology. In addition, it requires a firm and transparent collaboration with the Minister of Health and SOCSO to provide the necessary
data in order to pinpoint the possibility of the ordinary diseases of life with the occupational disease.

5 Conclusion

For the conclusion, a better perspective of compensations is needed to protect workers with an immense risk to contract the above exotic diseases. We believe that, if medical intervention able to succinate / clear the infections, not all the disease will end in fatality. Perhaps, they might survive with a temporary or permanent disability. These occupational disease survivors still have a right to receive injury compensation or perhaps, a comprehensive therapy to improve their wellbeing and increase their eligibility for work re-entry programs.

As we are currently facing endless economy turbulences, it is important for government, insurance provider, and stakeholders to raise awareness and educate workers about the consequences of occupational disease and its impacts on the country fiscals and talent. An extensive collaboration with the medical researcher, SOCSO and other related organizations is also important to improve data of exposure hazard identification beyond currently reported diseases (13), so it will convey compassion-justified claims without hurting any parties.

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