

TERM PAPER

ON

ASSESSMENT OF OCCUPATIONAL HAZARDS AND DEVELOPMENT OF ENGINEERING EQUIPMENT TO SUPPORT HEALTH WORKERS AGAINST COVID-19

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# CERTIFIFCATION

This is to certify that OLANREWAJU TEMITOPE CHARLES with matric number 18/ENG04/083, student of AFE BABALOLA UNIVERSITY compiled this report.

# DEDICATION

This report is dedicated foremost to God Almighty for his favour, mercy and grace upon my life especially during my process of writing this report.

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I am grateful to God for providing me with such an opportunity to be able to complete this report. I also thank the engineering college and their lecturers who made this course fun from and insightful from the start.

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# Abstract

Hospital personnel are subject to various occupational hazards. Awareness of these risks, compliance with basic preventive measures, and adequate resources for interventions are essential components of an occupational health program. Physical, chemical, and radiation hazards; important infectious risks; and psychosocial problems prevalent in hospital workers are reviewed. A rational approach to managing and preventing these problems is offered through the development of engineering equipment.

# OBJECTIVE OF STUDY

The following research objectives were formulated as the set objectives of assessment of occupational hazards and development engineering equipment against covid-19.

* What is covid-19
* Forms of hazards in the health industry
* In-depth discussion on health hazards
* Types of engineering equipment developed to combat covid-19
* Scopes of health engineering equipment

# INTRODUCTION

The start of this new decade was dampened by reports of a cluster of novel viral pneumonia in Wuhan City, China. On 30 January 2020, the World Health Organization (WHO) declared this emerging infectious disease, now known as Coronavirus disease 2019 (COVID-19) as a Public Health Emergency of International Concern and on 11 March 2020, declared COVID-19 a pandemic. Merely 3 months from the time it has first reported, COVID-19 has spread rapidly from its epicenter in Wuhan City to 113 countries outside of mainland China. At the time of writing, there are more than 118,000 cases globally and almost 4300 fatalities.

 Coronavirus disease (COVID-19) is an infectious disease caused by a newly discovered coronavirus. Most people infected with the COVID-19 virus will experience mild to moderate respiratory illness and recover without requiring special treatment. Older people, and those with underlying medical problems like cardiovascular disease, diabetes, chronic respiratory disease, and cancer are more likely to develop serious illness.

 The COVID-19 virus spreads primarily through droplets of saliva or discharge from the nose when an infected person coughs or sneezes, so it’s important that you also practice respiratory etiquette (for example, by coughing into a flexed elbow). At this time, there are no specific vaccines or treatments for COVID-19. However, there are many ongoing clinical trials evaluating potential treatments

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# METHODOLOGY

The methodology used in his term paper is an Internet-based research method, this method refers to any research method that uses the Internet to collect data. The internet is a compelling tool for research, enabling efficient, cost-effective data collection and facilitating access to large samples and new populations. This book presents a state-of-the-art guide to the internet as a tool for conducting research in the social and behavioural sciences using qualitative, quantitative and mixed methods approaches. Most commonly, the Web has been used as the means for conducting the study, but e-mail has been used as well. The use of e-mail to collect data dates back to the 1980s while the first uses of the Web to collect data started in the mid-1990s. Whereas e-mail is principally limited to collection of other people findings based on their research papers.

# LITERATURE REVIEW

In this section we will be reviewing the questions and topics which includes important definition and types of occupational hazards. The scopes and the ways to which engineering equipment affect the health industry will be discussed. The question covered in this literature review are as follow:

1. What is covid-19
2. What are the symptoms
3. WORKERS WHO will be at a exposure risks
4. what is an occupational hazard
5. Ways to which covid-19 affects the health system and the workers in it
6. forms of occupational hazards affecting health workers
7. In depth view of various form of occupational hazard affecting health workers
8. Scenarios where the spread of covid-19 can be prevalent and ways to which health workers can combat it while ensuring their safety
9. In the case of an outbreak how can we intercept the circulation of covid-19
10. Health care engineering equipment
11. scope of health care engineering equipment's
12. Ways to which engineering controls the spread of covid-19
13. Equipment that are to be developed to eradicate or reduce the spread covid-19 pandemic among health workers
14. How are these equipment developed
15. Advantages of health engineering equipment's
16. Disadvantages of health engineering equipment

## WHAT IS COVID-19

Coronavirus disease (COVID-19) is an infectious disease that falls under coronavirus.

## WHAT ARE THE SYMPTOMS

People may be sick with the virus for 1 to 14 days before developing symptoms. The most common symptoms of coronavirus disease (COVID-19) are fever, tiredness, and dry cough. Most people (about 80%) recover from the disease without needing special treatment.

More rarely, the disease can be serious and even fatal. Older people, and people with other medical conditions (such as asthma, diabetes, or heart disease), may be more vulnerable to becoming severely ill.

People may experience:

Cough

Fever

Tiredness

Difficulty breathing (severe cases)

## WORKERS WHO WILL BE AT AN EXPOSURE RISK

Despite the low risk of exposure in most job sectors, some workers may have exposure infectious people, including travelers who contracted COVID-19 abroad.

Workers with increased exposure risk include those involved in:

Healthcare (including pre-hospital and medical transport workers, healthcare providers, clinical laboratory personnel, and support staff).

Deathcare (including coroners, medical examiners, and funeral directors).

Airline operations.

Waste management.

Travel to areas, including parts of China, where the virus is spreading.

## WHAT IS OCCUPATIONAL HAZARD

Occupational hazards are risks of illnesses or accidents in the workplace. In other words, hazards that workers experience in their place of work. An occupational hazard is something unpleasant that a person experiences or suffers as a result of doing their job.

## WAYS TO WHICH COVID-19 AFFECTS THE HEALTH SYSTEM AND THE WORKERS IN IT

Vaccine development and research into medical treatment for COVID-19 are under way, but are many months away. Meanwhile, the pressure on the global health care workforce continues to intensify. This pressure takes 2 forms. The first is the potentially overwhelming burden of illnesses that stresses health system capacity and the second is the adverse effects on health care workers, including the risk of infection.

## FORMS OF OCCUPATIONAL HAZARDS AFFECTING HEALTH WORKERS

The four main types of occupational hazards and diseases are as follows:

1. Chemical Hazards

2. Biological Hazards

3. Environmental Hazards

4. Psychological Hazards.

## IN DEPTH VIEW OF VARIOUS FORM OF OCCUPATIONAL HAZARD AFFECTING HEALTH WORKERS

Chemical hazards: this type of hazards put the health workers at risk in such situations where they are handling chemicals this includes chemical used to disinfect the covid-19 droplet on surfaces. This can cause serious respiratory problems. So the health workers must be trained on how use this equipment's. This hazard may affect sanitation officer or cleaners trying to disinfect the infected surroundings.

Biological hazards: this types of hazard pose a risk on health workers such that the viruses may become effective in the organs of the health workers. This are hazards related with the handling of virus either by a lab technician. This hazards will also affect nurses and doctors treating in infected patient.

Environmental hazards: This are hazards that pose such risk that they are not consisting of biological properties but may include physical and external injuries to the doctors or nurses. This types of Injuries may include backache and other related injuries such as injuries from slippery floor, inadequate ventilation, and poor lightning. All these can cause health hazards to our nurses and doctors combating the pandemic of covid-19.

Psychological hazards: This are hazards that pose risk on the health workers such that their mental wellbeing starts to detioriate. This hazards may include constant exposure to an undue, repetitive and monotonous amount work. This may lead to job dissatisfaction which can further lead to various types of mental disorders.

## SCENARIOS WHERE THE SPREAD OF COVID-19 CAN BE PREVALENT AND WAYS TO WHICH HEALTH WORKERS CAN COMBAT IT WHILE ENSURING THEIR SAFETY

Many additional questions and concerns remain, especially in high-risk sites and clinical settings. One problem is in the emergency department, where crowding is identified as a major concern. Rigor in the use of recommended precautions for all patients with respiratory illness is especially important. Placing a facemask on the patient at arrival, supplying tissues, promoting cough etiquette, and providing for hand hygiene and surface decontamination are all important steps. Those patients with symptoms of suspected COVID-19 should be rapidly triaged and separated from the general population ideally in a well-ventilated space with a distance of at least 6 feet from others until they can be placed in an isolation room.

## IN THE CASE OF AN OUTBREAK HOW CAN WE INTERCEPT THE CIRCULATION OF COVID-19

Since there no vaccines out yet, we have to make do with the following steps to prevent covid-19

We can intercept the circulation of covid-19 in this small but major steps

Performing hand hygiene frequently with an alcohol-based hand rub if your hands are not visibly dirty or with soap and water if hands are dirty;

Avoiding touching your eyes, nose and mouth;

 Practicing respiratory hygiene by coughing or sneezing into a bent elbow or tissue and then immediately disposing of the tissue;

Wearing a medical mask if you have respiratory symptoms and performing hand hygiene after disposing of the mask;

 Maintaining social distance (a minimum of 1 m) from individuals with respiratory symptoms

Additional precautions are required by healthcare workers to protect themselves and prevent transmission in the healthcare setting. Precautions to be implemented by healthcare workers caring for patients with covid-19 disease include using ppe appropriately; this involves selecting the proper ppe and being trained in how to put on, remove and dispose of it.

## ENGINEERING

Definition

The branch of science and technology concerned with the design, building, and use of engines, machines, and structures.

## HEALTH CARE ENGINEERING EQUIPMENT

In its succinct definition, Healthcare Engineering is "engineering involved in all aspects of healthcare”. The term “engineering” in this definition covers all engineering disciplines such as biomedical, chemical, civil, computer, electrical, environmental, and industrial, information, materials, mechanical, software, and systems engineering.

Based on the definition of healthcare, engineering equipment is more elaborated in its prevention, diagnosis, treatment, and management of illness, as well as the preservation and improvement of physical and mental health and well-being, through the services offered to humans by the medical and allied health professions”

## PRACTICE OF ENGINEERING INCLUDES

Planning, Operation, Maintenance, Supervision of Construction, Advising, Installation, Operating, Investigating, Evaluating, Analysis and Design, Measuring Designing, Specifying, Laying and Directing, Constructing, Commissioning Testing( public or private utilities) structures, buildings, machines, equipment, processes, works or projects

## SCOPE OF HEALTH CARE ENGINEERING EQUIPMENT'S

Engineering for Healthcare Intervention: Engineering involved in the development or provision of any treatment, preventive care, or test that a person could take or undergo to improve health or to help with a particular health problem.

Engineering for Healthcare Systems: Engineering involved in the complete network of organizations, agencies, facilities, information systems, management systems, financing mechanisms, logistics, and all trained personnel engaged in delivering healthcare within a geographical area.

## WAYS TO WHICH ENGINEERING CONTROLS THE SPREAD OF COVID-19

Administrative controls include ensuring the availability of resources for infection prevention and control measures, such as appropriate infrastructure, the development of clear infection prevention and control policies, facilitated access to laboratory testing, appropriate triage and placement of patients, adequate staff-to-patient ratios and training of staff.

Environmental and engineering controls aim at reducing the spread of pathogens and reducing the contamination of surfaces and inanimate objects. They include providing adequate space to allow social distance of at least 1 m to be maintained between patients and between patients and healthcare workers and ensuring the availability of well-ventilated isolation rooms for patients with suspected or confirmed COVID-19 disease.

## EQUIPMENT THAT ARE TO BE DEVELOPED TO ERADICATE OR REDUCE THE SPREAD OF COVID-19 PANDEMIC AMONG HEALTH WORKERS

To ensure minimal risk of infection when treating patients with COVID-19 the following engineering facilities/equipment will suffice

Large and well ventilated infrastructures to maintain the 1m spacing between patients and between workers and patients.

On the go laboratories for testing and confirming new cases.

Development of commercial testing kit (this may include basic equipment such as thermometer

Development of decontamination equipment for infected surfaces

Vaccines but we are still in the early stage of the illness

Digital online hospital to attend to outpatient who have other illnesses so as to create more space in the hospitals

Manufacture of personal protective equipment including a gown, gloves, and either an N95 respirator plus a face shield/goggles or a powered, air-purifying respirator (PAPR).

## HOW ARE THESE EQUIPMENT DEVELOPED

The various equipment and infrastructures listed in the prevailing slide are manufactured by engineers in advance countries like china and America. This equipment have then been bought by other countries. However the engineered equipment have been seen to reduce the number of casualties in the hospitals by protecting the health workers even in third world countries. Since the goods arrived and worked as supposed to. This correspond to the fact that there has been a successful contract between the two parties.

## ADVANTAGES OF HEALTH ENGINEERING EQUIPMENT'S

Decrease reimbursement costs.

Improve the quality of care.

Improve patient satisfaction.

Decreases infection rate amongst coworkers and patient to worker infection.

## DISADVANTAGES OF HEALTH ENGINEERING EQUIPMENT

They may require larger spaces

They may require a lot of funding

## CONCLUSION

Hospital personnel, including caregivers, support staff, administration, and preparedness teams, all will be stressed by the challenges of a prolonged response to COVID-19, and leadership must emphasize the importance of self-care as the center of the response. Transparent and thoughtful communication with the use of engineering equipment could contribute to trust and a sense of control. Ensuring that workers feel they get adequate rest. This will Implement and introduce a reduction in the health hazards faced by health workers