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Risk exposure and risk management among healthcare workers during the COVID-19 scenario: Keep health workers safe to keep patients safe (WHO)

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Abstract--The incomparable crisis of this century, Covid-19 has affected the life and health of people across the world. The pandemic created unexpected pressure on many country's healthcare system and the worst affected among the population were healthcare providers, especially doctors and nurses, who are in the frontline fighting against the deadly Corona virus. WHO Director General in his opening remarks in World Health Assembly (2021) commented that "At least 115,000 health care workers has lost their lives due to Covid-19 around the globe, according to updated figures from the World Health Organization". This pandemic has caused tremendous concern for hospital authorities to respond to the health needs of the patients as well to protect the frontline workers. Nurses along with doctors are the first line of defence at times of unprecedented outbreak. This study aims to assess the risk exposure and management among the doctor-nurse community who provide care for patients diagnosed with Covid-19. The proposed study follows a quantitative-descriptive design. SWOT Analysis is employed to explore the possibilities of improving the working conditions of frontline workers in Healthcare sector. The outcome of SWOT matrices reveals the different combination of strategies could be adopted to enhance the risk management in the healthcare sector.

Keywords---nurses, doctors, COVID-19 pandemic, SWOT, risk assessment, risk management, WHO.

Introduction

The World Health Organization (WHO) has declared the novel corona virus (Covid-19) outbreak a global pandemic on March 11, 2020. As of 19th August 2022, there have been 591,683,619 confirmed cases of Covid-19, including 6,443,306 deaths, reported to WHO. India reported the second highest number of cases of Covid-19 after United States of America. Among the total population, Healthcare workers are exposed to a higher degree of both occupational and non-occupational risk. Previous experiences of a similar disease, the severe acute respiratory syndrome (SARS), have left behind a distressing toll on the health-care providers. During the SARS outbreak in 2002, WHO confirmed 8098 cases and 774 (9.6 percent) deaths of which HCW accounted for 1707 (21 percent) cases. When millions of populations decided to stay safe at home, Healthcare workers, the real warriors were mandated to take up the duty of caring and treating Covid-19 patients, thus putting themselves at a high risk of exposure to infection. As per WHO report, based upon the data available till Jan 2022, the number of infected cases regarding healthcare workers were 3,535,142, of which, 8287 deaths were reported.

Evidence reveals that (Atnafie et al, Bandhypoadhyay S et al, Nyugen et al., Sabetian et al., Jatoi et al., Ashinyo et al., (2020, 2021)) irrespective of all safety measures and protocol followed, there were high chances of exposure to virus and eventually death. It is imperative to ensure the safety of HCWs in terms of safeguarding continuous patient care along with assurance of precautionary initiatives to contain the virus transmission. A clear understanding of the current pandemic situation and the risk management measures adopted provides better understanding about the risk element associated and thereby to overcome the challenges raised by an unprecedented healthcare emergency. Review studies were conducted in different countries based on risk assessment and exposure among healthcare workers in the current context.

Review of related studies

Certain noted studies (Atnafie et al, Bandhypoadhyay S et al, Nyugen et al, Sabetian et al., Jatoi et al., Ashinyo et al., (2020, 2021)) were initiated during the pandemic period to understand the causes relating to risk exposure and the strategies adopted to mitigate risk associated with loss of life among the frontline workers. The prime focus of research was to assess the risk exposure and to explore various effective strategies that need to be adopted for ensuring effective risk management. Cross sectional survey conducted among the target representations from five different countries including UK, USA, Ethiopia, Ghana and Saudi Arabia and the information gathered were employed to identify the factors associated with risk exposure among the healthcare workers. The empirical outcomes revealed that, healthcare workers who performed or were present during any aerosol-generating procedures are likely to be more exposed to risk (Ashinyo et al.). Poor understanding and bad practices of Covid-19 preventing

measures among health workers results in delayed identification and treatment leading to the rapid spread of coronavirus infections (Atnafie et al., Sabetein et al.). These studies highlighted the importance to improve and initiate protective measures to these vulnerable, yet highly essential group. Increased number of death among healthcare workers were due to reasons like decreased personal protective equipment and the poor health care management systems of the countries in the region to combat the pandemic (Jatoi et al.). It was inferred that health-care system should ensure adequate accessibility of necessary protection equipment's including PPE, gloves, mask (Nguyen et. al) and to provide training to the healthcare workers on management of Covid patients, ventilation strategy, management of aerosol generating medical equipment, infection and prevention control practices etc.

Need of the study

While health workers represent less than 3 percent of the population in most countries and less than 2 percent in almost all low- and middle-income countries, around 14 percent of Covid-19 cases reported to WHO are among health workers. In some countries, the proportion can be as high as 35 percent. Frontline healthcare workers have taken the burden to fight against the contagious Covid-19 virus. Despite following the WHO protocols and precautions, high number of infection cases and mortality were reported among the healthcare workers due to the severe acute respiratory syndrome coronavirus (SARS-COV) which is evidence projecting the degree of risk exposure to which they are exposed. Apart from various precautionary measures adopted by the state, somehow experience reflected a gap in mitigating risk to ensure protection. This study initiates to identify the various elements corresponding to risk exposure and the subsequent strategies adopted across the globe towards effective risk management.

Objectives of the study

- To understand the rate of infection and death among the healthcare workers from the global and national perspectives.
- To comprehend the factors constituting to risk exposure and the subsequent risk management strategies.

Scope of the study

This study provides a better understanding about the available real information extracted from the WHO data base. The challenge faced in terms of risk mitigation in the preliminary phase of study of similar kind projects the better combinations of pros and cons, which may pave light for next level of empirical research. Further, the descriptive observations made in this study would encourage to conduct research where inter, intra and cross-country comparisons would be initiated by young researchers to propose and recommend strategies for optimizing risk assessment measures.

Risk exposure and risk management during the pandemic

Covid-19 is continuing across the world, with more than 590 million confirmed cases and more than six million deaths were reported to WHO. The countries US, India and France did report the highest number of Covid-19 cases and death toll with Brazil, Germany and UK at the latter positions as observed in the table below:

Table 1
List of top ten countries with highest number of Covid-19 cases

Country	Cases	Deaths	Region
United States	95,345,858	1,065,569	North America
India	44,348,960	527,368	Asia
France	34,354,612	153,501	Europe
Brazil	34,284,864	682,587	South America
Germany	31,808,179	146,504	Europe
United Kingdom	23,460,787	187,018	Europe
South Korea	22,299,377	26,109	Asia
Italy	21,650,468	174,722	Europe
Russia	19,117,343	383,560	Europe
Japan	17,140,240	37,021	Asia

Source: www.worldometers.info as on 22/08/2022

From the table it is observed that India positioned second in terms of 44,348,960 covid cases with a death toll of 5, 27,368, thus holding the first position among Asian countries. The following table exhibits the number of cases reported among health care workers and the subsequent number of deaths from 66 member countries under the WHO region as per the latest updates (Aug 2022).

Table 2
Infection cases and Number of deaths among Health care workers during Covid-19 pandemic

Time period	Cases in HCWs	Deaths in HCWs
1 st January 2020 - 31 th March 2020	77,144	128
1 st April 2020 – 30 th June 2020	4,24,347	1,626
1 st July 2020 – 30 th September 2020	3,14,627	1,382
1 st October 2020 - 31 st Dec 2020	9,97,648	2,024
1 st January 2021 - 31 th March 2021	5,09,540	1,461
1 st April 2021 – 30 th June 2021	2,11,540	521
1 st July 2021 – 30 th September 2021	2,73,124	552
1 st October 2021 - 31 st Dec 2021	5,08,234	540
1 st January 2022 - 31 th March 2022	11,82,254	253
1 st April 2022 – 30 th June 2022	3,21,045	26
1 st July 2020 – 8 th August 2022	1,59,104	12

Source: WHO Database

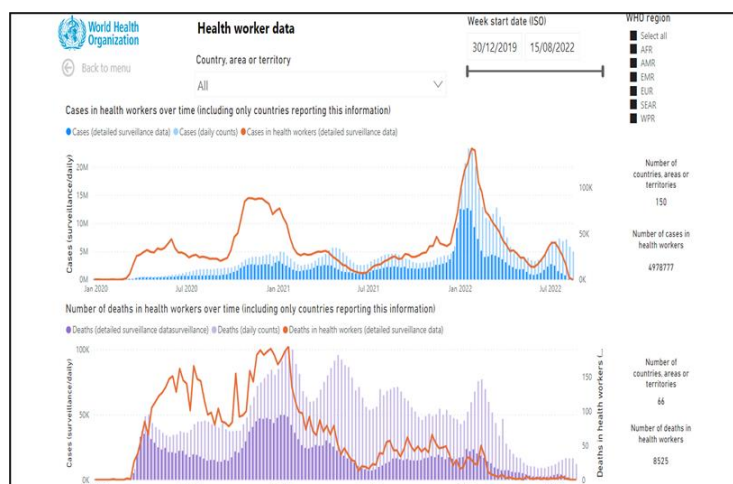


Chart 1. Graphical representation of Number of Infection cases and deaths among Health care workers during Covid-19 pandemic
Source: WHO Database

It is observed that, the highest numbers of infection cases (11, 82,254) were reported during the time of January to March 2022 whereas; the highest mortality (2,024) was reported during October to December 2020. Health being as an important priority in the state agenda, the major challenge faced by the Central government is the lack of data availability about the deceased healthcare workers. The Government of India has maintained data on total cases and deaths reported by States/UTs on a regular basis. The Union Health Minister, Mansukh Manadaviya mentioned to Rajya Sabha that only six out of thirty-six states and union territories maintained separate records stating the number of deceased healthcare workers during the pandemic in the last two years (February 8, 2022). Indian Medical Association (IMA) maintains the state wise doctors' martyrs list. According to the IMA records, during the first wave in India, 749 deaths were reported due to Covid-19 infections among doctors whereas in the second wave, it increased up to 798. Among the states, Bihar recorded the highest toll of 153, followed by Delhi with 151 reported deaths.

Risk exposure and risk management: SWOT analysis

SWOT Analysis is applied to establish the association between Risk exposure and Risk Management regarding the existing Covid-19 care management among Healthcare workers across the globe. The reviewed studies highlighted various factors associated with risk exposure and the measures suggested for reducing risk associated with exposure towards infection among the frontline workers paying way to loss of life.

STRENGTH	WEAKNESS
<ul style="list-style-type: none"> Globally provided guidelines for from WHO which ensured uniform approach in handling 	<ul style="list-style-type: none"> Though healthcare workers used precautionary equipment, their exposure rate towards

<p>global pandemic.*</p> <ul style="list-style-type: none"> • Inclusion of every healthcare personal under Health Worker category (HW) in the WHO assessment.[†] • Online training and webinars were conducted by National and International Organizations on management of Covid-19 patients, ventilation strategy, management of aerosol generating medical equipment, infection, and prevention control practices etc.[‡] • Healthcare workers are aware about Covid-19 as a deadly, contagious, and life-threatening disease.[§] • Competent vaccine formulae were achieved in record time.^{**} • Healthcare workers are given priority in the distribution of vaccination drive.^{††} 	<p>infection was high.^{‡‡}</p> <ul style="list-style-type: none"> • Standardized common health/life insurance schemes were not made available then globally. • Maintaining protocol was very difficult during the peak time of infected cases.^{§§} • Lack of preparation time to handle the pandemic outbreak.^{***} • Shortage of medical support facilities. • Lack of health infra such as medical oxygen generating plants, indigenous manufacturing of personal equipment, etc. • Psychological and mental illness occurred due to heavy work pressures.^{†††}
<p>OPPORTUNITIES</p> <ul style="list-style-type: none"> • Identify the areas where weak management strategies were adopted during the pandemic outbreak.^{###} • Strengthening of international trade relations between countries with mutual 	<p>THREATS</p> <ul style="list-style-type: none"> • Open disposal of personal and medical equipment used by the frontline workers.^{††††} • Lack of specialist healthcare personnel such as (anaesthesiologist, pulmonologist, etc.).^{####}

*To access the full guidance please visit: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/maintaining-essential-health-services-and-systems>

[†]<https://www.who.int/publications/m/item/risk-assessment-and-management-of-exposure-of-health-care-workers-in-the-context-of-covid-19-data-template>

[‡]<https://www.mohfw.gov.in/pdf/MeasuresUndertakenToEnsureSafetyOfHealthWorkersDraftedForCOVID19Services.pdf>

[§]Tripathi, R., Alqahtani, S. S., Albarraq, A. A., Meraya, A. M., Tripathi, P., Banji, D., Alshahrani, S., Ahsan, W., & Alnakhli, F. M. (2020). Awareness and Preparedness of COVID-19 Outbreak Among Healthcare Workers and Other Residents of South-West Saudi Arabia: A Cross-Sectional Survey. *Frontiers in public health*, 8, 482.

^{**} <https://connect.uclahealth.org/2020/12/10/the-fastest-vaccine-in-history/>

^{††}Symons, X., Matthews, S. & Tobin, B. Why should HCWs receive priority access to vaccines in a pandemic?. *BMC Med Ethics* 22, 79 (2021). <https://doi.org/10.1186/s12910-021-00650-2>

^{‡‡}Atnafie SA, Anteneh DA, Yimenu DK, Kifle ZD (2021) Assessment of exposure risks to COVID-19 among frontline health care workers in Amhara Region, Ethiopia: A cross-sectional survey. *PLoS ONE* 16(4): e0251000. <https://doi.org/10.1371/journal.pone.0251000>

^{§§}Sabetian, G., Moghadami, M., Hashemizadeh Fard Haghighi, L. et al. COVID-19 infection among healthcare workers: a cross-sectional study in southwest Iran. *Virology* 18, 58 (2021). <https://doi.org/10.1186/s12985-021-01532-0>

^{***} <https://www.brookings.edu/research/preparing-for-the-next-pandemic-early-lessons-from-covid-19/>

^{†††}Joseph, B., & Joseph, M. (2016). The health of the healthcare workers. *Indian journal of occupational and environmental medicine*, 20(2), 71–72

^{###} <https://www.who.int/news/item/03-03-2020-shortage-of-personal-protective-equipment-endangering-health-workers-worldwide>

<p>agreement and cooperation to improve better accessibility of medical assistance. §§§</p> <ul style="list-style-type: none"> • Advanced medical research in shorter time.**** • Explore the dynamics of medical advancement by providing skill based specialized training and development programs. • Bitter experiences from the pandemic mandate the policy makers to get self-prepared for any unprecedented occurrences. • Widening the scope of horizontal and vertical integrations to enhance health infrastructure and healthcare services. 	<ul style="list-style-type: none"> • Life and job uncertainty among the healthcare workers during the pandemic. §§§§ • Loss of expert work force due to the high mortality among healthcare workers globally.***** • Perception of non-exposure to Covid-19 and poor habit of decontamination of high touch areas increases the risk factors associated with reported Covid-19 cases among healthcare workers. +++++ • Elderly Healthcare workers do face high risk while handling Covid-19 patients. • Cases reported Healthcare workers transmitting the infection to family and friends+++++
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SWOT matrix

The results of the SWOT analysis determine whether objectives, services, products, and goals are a strategic fit. The best strategic fits are when the internal environment (strengths and weaknesses) aligns with the external environment (opportunities and threats).

<p>S-O Strategies</p> <p>Great international relationships were exhibited among countries during the pandemic irrespective of their economic statuses. This shall be further developed into an international trade policy among countries.</p> <p>Online training on Covid-19 management was helpful in sharing information to healthcare workers across the globe at one time, this methodology shall further be used to share knowledge between different</p>	<p>W-O Strategies</p> <p>There is a lack of uniform life insurance packages available for healthcare workers, a common health/life insurance package shall be recommended by international organizations to countries.</p> <p>Lack of sufficient workforce and time was a major constraint during the pandemic management. Nevertheless, concentrating more on creating a strong healthcare workforce will ensure confidence in handling pandemic</p>
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++++ https://apps.who.int/iris/bitstream/handle/10665/331498/WHO-2019-nCoV-IPCPPE_use-2020.2-eng.pdf

**** <https://www.ijccm.org/doi/IJCCM/pdf/10.5005/jp-journals-10071-23395>

§§§ https://trade.ec.europa.eu/doclib/docs/2020/june/tradoc_158776.pdf

**** Tuttle, K.R. Impact of the COVID-19 pandemic on clinical research. *Nat Rev Nephrol* 16, 562–564 (2020). <https://doi.org/10.1038/s41581-020-00336-9>

§§§ Shreffler, J., Petrey, J., & Huecker, M. (2020). The Impact of COVID-19 on Healthcare Worker Wellness: A Scoping Review. *The western journal of emergency medicine*, 21(5), 1059–1066. <https://doi.org/10.5811/westjem.2020.7.48684>

*****Health Worker Data, WHO Database

+++++Atnafie SA, Anteneh DA, Yimenu DK, Kifle ZD (2021) Assessment of exposure risks to COVID-19 among frontline health care workers in Amhara Region, Ethiopia: A cross-sectional survey. *PLoS ONE* 16(4): e0251000.

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parts of the world with respect to the healthcare sector.	situations in future.
<p>S-T Strategies</p> <p>The provision of uniform guidelines in managing the pandemic by WHO was a great strength, similarly, guidelines shall be initiated to manage the medical waste generated during the pandemic, which is considered a major threat. Indigenously manufactured vaccines are one of the major strengths identified during the Covid-19 pandemic management. The same initiative shall be employed in manufacturing medical equipment to reduce the threat of dependence on other countries and shortage of the same.</p>	<p>W-T Strategies</p> <p>Lack of medical supplies and oxygen was a major weakness in pandemic management across the globe, precautionary measures need to be taken immediately to avoid the same in near future, which can be a huge threat in managing the healthcare system. Several healthcare workers lost their lives during their fight against the pandemic, this led to the shortage of workforce to meet the healthcare requirements. A possible policy measure should be initiated to recruit more healthcare workers to avoid shortages in the upcoming days. Specialist doctors and trained healthcare workers for handling medical equipment such as ventilators and life support systems were insufficient during the Covid-19 management. This may end up with a serious threat to the healthcare system. Hence, proper training shall be provided in handling the life supporting medical equipment.</p>

Discussion and Conclusion

Health in India is a state subject, and the union government's role is often constrained. However, both central and state governments have to work hand-in-hand by adopting the India's Epidemic Diseases Act, 1897 strategy to balance the pandemic situation. Based on the SWOT Analysis, the strength, weakness, opportunity and threat relating to risk exposure and management were identified. The outcome of the analysis revealed the various aspects of healthcare management across the globe. Strength such as uniform guidelines, awareness among healthcare workers about Covid-19, online training, indigenous vaccine developed in record time were accomplished during the management of pandemic.

Similarly, the areas of concern in managing the pandemic were also explored such as high infection rate among healthcare workers, lack of preparation time, absence of uniform health/life insurance scheme and lack of medical infrastructure. These are the major weakness associated the risk management, especially during the pandemic. The effect of pandemic has created major threats to the healthcare system like lack of specialist care physicians, skilled healthcare workers for handling life-supporting medical equipment and job/life uncertainty faced by the healthcare workers. Experiences from the pandemic management paved way for new opportunities in the healthcare system through international

relations, provision of specialized training for healthcare workers and medical innovation within shorter time frame. SWOT matrices explores the combination of different strategies that shall be adopted for developing a strong healthcare system with which further health crisis shall be handled appropriately through better risk management strategies. The outcome of the study helps in understanding the effectiveness of risk management strategy followed across the globe during the pandemic.

Strategies adopted by India

In India, the Central Government has introduced various schemes and measures to provide comprehensive personal accident cover to frontline workers who were deceased during the pandemic. The Centre has already paid compensation of about Rs 808 crores to the families of deceased healthcare workers from 33 states and UTs.^{§§§§§} The Insurance Scheme Pradhan Mantri Garib Kalyan Package (PMGKP) was launched on March 30, 2020 to provide a comprehensive personal accident cover of Rs 50 lakh to the 22.12 lakh healthcare providers in India. These include community and private healthcare workers who may have been in direct contact with COVID-19 patients and their care, and may be at risk at the similar level. SWOT matrices represents the various strategies that can be adopted to overcome the difficulties in risk management. By adopting these strategies, any nation would be able to handle risk management efficiently.

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