Experience of Prolonged Use of Face Mask by Health Service Providers

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Abstract:

Background:
In March 2020, Bangladesh encountered its first official case of COVID-19 (Coronavirus disease 2019). This novel coronavirus, referred to as SARS-COV2, originated in Wuhan, China in December 2019. Within a short amount of time, hundreds to thousands of cases were diagnosed around the World, causing the World Health Organization to announce it as an official infectious disease pandemic on January 30, 2020. COVID-19 is spread by respiratory droplets and healthcare professionals are mandated to wear PPE when caring for COVID-19 patients. Long term use of face mask may be necessary, but compliance may be low and physiologic effects have not been well evaluated. The purpose of this study is to assess knowledge regarding types, use, clean, store and compliance of face mask among health service providers and to determine the physiologic and subjective effects of prolonged use of mask experience by health service providers.

Methodology:
Forty web based questions were distributed electronically to health service providers who were working in different health centers. Total 417 health service providers participated in this study. This study was cross sectional analytical and was done from 01'August, 2020 to 30 September, 2020 in Rangpur Medical College and Hospital. All data generated were statistically analyzed using the computer based SPSS in 23.0 version of windows.

Results:
Age of total 417 respondents ranged from 18 years to 58 years years, 46% were in 30 – 40 years of age, male were 75% & female were 25%. Among health service providers doctor were 88%, nurse were 5%, ward boy were 5% and others were 2%. 83% respondents used more than one mask at a time. 38% participants stored their masks in paper made packet and 23% dried them in sunlight. 25% health service provider did not know the WHO/CDC guideline regarding wearing face mask. All respondents had experienced some sorts of adverse events due to wearing face mask. Among the experiences headache in 50%, pain behind ear in 81%, acne in 15%, extra wrinkles in 55%, rash in 13%, runny nose/ sneezing in 26%, nasal blockage in 24%, sore throat in 14%, cloudiness in goggles in 64%, exertional dyspnea in 66%, palpitation in 20%, tiredness in 67%, reduce memory in 12% and foul smell in oral cavity in 34% of the participant. 07% medical personnel did not wear face mask outside their working place. 07% health service providers became RT PCR positive for COVID19 in spite of wearing face mask.

Conclusion:
More than two third health service providers used more than one mask at a time, about one fourth of them did not aware about face mask wearing WHO/CDC guideline and all respondents had experienced adverse events due to wearing face mask.

Key words: Face Mask, Health Service Providers

Introduction:

In March 2020, Bangladesh encountered its first official case of COVID-19 (Coronavirus disease 2019). This novel coronavirus, referred to as SARS-COV2, originated in Wuhan, China in December 2019. Within a short amount of time, hundreds to thousands of cases were diagnosed around the World, causing the World Health Organization to announce it as an official infectious disease pandemic on January 30, 2020. COVID-19 is spread by respiratory droplets, and healthcare professionals are mandated to wear PPE when caring for COVID-19 patients. PPE includes gowns, gloves, masks, and face shields[1]. Following

the outbreak of the SARS-COV2 pandemic, use of face mask is widely recommended by international, national and local authorities. The aim of the regulations is to reduce the respiratory droplet excretion in pre-symptomatic and asymptomatic individuals[2]. The evidence for face masks to reduce respiratory viral infections or to improve clinical outcomes is heterogeneous[3,4]. However, as long as no effective treatment or vaccination against SARS-COV2 is available, health policies need to rely on non pharmacological interventions such as social distancing, intensified hand hygiene and the wearing of face masks[2]. Current recommendations to wear a face mask during times of contact to other individuals affect millions of persons. Especially healthcare professionals are required to wear masks for long periods of time[2]. Disposable surgical masks are intended to reduce transmissions from the wearer to the patient, hand to face contact and facial contact with large droplets. FFP2/N95 face piece respirators meet filtration requirements of small airborne particles, fit tightly to the wearer's face and have been suggested to be more efficacious than surgical masks in reducing exposure to viral infections[5]. They are, therefore, widely used by health care professionals for self-protection, especially during the SARS-COV2 pandemic. However, randomized trials did not find significant differences between FFP2/N95 and surgical masks in preventing influenza infections or respiratory illness[6,7]. The last incidence of prolonged use of PPE among healthcare professionals was during the SARS outbreak in 2003-2004 which originated in Guangdong, China. Studies focusing on effects of prolonged use of PPE during the SARS outbreak were published in subsequent years. A study by Lim, et al. focused on headaches related to mask use[8] and another study by Foo, et al. discussed adverse skin reactions such as rashes, acne and itching from mask use[9]. Wearing masks for a prolonged amount of time causes a host of physiologic and psychologic burdens and can decrease work efficiency. Activity cannot be performed as long or as efficiently while wearing masks as compared to when masks are not worn[10]. Prolonged use of N95 and surgical masks cause physical adverse effects such as headaches, difficulty breathing, acne, skin breakdown, rashes and impaired cognition. It also interferes with vision, communication and thermal equilibrium. Headaches related to prolonged mask use can be attributed to mechanical factors, hypercapnia and hypoxemia. Tight straps and pressure on superficial facial and cervical nerves are mechanical features causing headaches[8]. Cervical neck strain from donning PPE, sleep deprivation, irregular meal times, and emotional stress are other sources of headaches among healthcare professionals during prolonged mask use[11]. Tight fitting masks cause inadequate ventilation and increased levels of CO2 known as hypercapnia. As CO2 is known respiratory stimulant, a build up of exhaled CO2 between the mask and face will cause increased lung ventilation and respiratory activity. Symptoms of hypoxemia such as chest discomfort and tachypnea are also noted in healthcare professionals with prolonged mask use. Exhaled CO2 builds up between mask and face and increased levels of CO2 cause confusion, impaired cognition and disorientation[10]. The moist environment and pressure from tight fitting masks also block facial ducts. This can explain the increase of acne with prolonged mask use[9]. Frequent PPE and mask changes may cause shearing and breakdown of the skin and breakdown on the bridge of the nose and cheek bones can be attributed to tight fitting masks and goggles that put pressure on these specific areas[12]. Urticaria and contact dermatitis can occur from sensitivity to components of masks and PPE[13]. Long term use of face mask may be necessary but compliance may be low and physiologic effects have not been well evaluated. The purpose of this study is to assess knowledge regarding types, use, clean, store and compliance of face mask among health service providers and to determine the physiologic and subjective effects of prolonged use of mask experience by health service providers.

Methods and materials:

40 web based survey questions were distributed electronically among health service providers who were working in different hospitals. Total 417 health service providers participated in this study. This study was cross sectional analytical and was done from 01August, 2020 to 30 September, 2020 in Rangpur Medical College and Hospital. All data generated were statistically analyzed using the computer based SPSS in 23.0 version of windows.

Results:

Among 417 respondents male were 75% and female were 25%. Age of respondents ranged from 18 years to 58 years, 22% ages 18 – 30 years, 46% ages 30 – 40 years, 22% ages 40 – 50 years

and 10% ages more than 50 years and mean age were 36.12±14 years. 65% health service providers wore facemask 8 to 12 hours in a day, 30% 4 to 8 hours, 5% wore more than 12 hours and none wore less than 4 hours a day. Out of 417 respondents, majority (88%) were doctor, 5% were nurse, 5% were ward boy and 2% were other health service providers. 87% health service providers used Surgical mask, 18% cloth made mask, 58% N95 and 73% KN95 facemask. 83% respondents used more than one mask at a time. 38% participants stored their masks in paper made packet and 23% dried them in sunlight. 25% health service provider did not know the WHO/CDC guideline regarding wearing face mask. 30% did not maintain social distance with facemask. All respondents had experienced some sorts of adverse events due to wearing face mask. Among cardiopulmonary experiences 66% had dyspnea, 20% palpitation, increased cough in 18%, 26% had runny nose, 24% developed nasal blockage and 14% experienced sore throat. According to neurological adverse events, 50% respondents developed headache, 20% vertigo, 23% blurring of vision, 67% experienced tiredness and 12% noticed reduction of memory. According to dermatological adverse events, 15% experienced acne, 55% abnormal wrinkles in face and 13% had rash in their face. 81% health service providers developed pain behind the ear, 64% noticed cloudiness of goggles, 34% experienced foul smell in oral cavity and 4% developed oral ulcer. 07% medical personnel did not wear face mask outside their working place. 07% health service providers became RT PCR positive for COVID-19 in spite of wearing face mask.

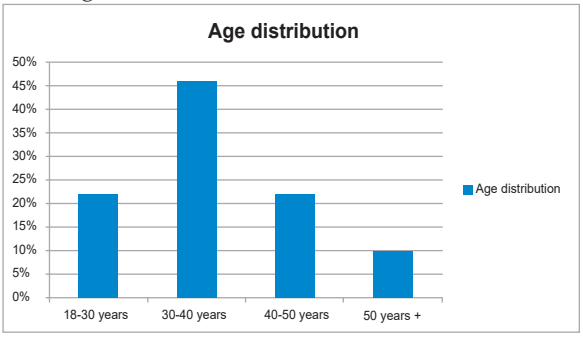


Figure-1: According to age distribution. 22% respondent health service providers were in between 18–30 years, 46% were in 30–40 years, 22% were in 40–50 years and 10% were above 50 years.



Fugure-2: According to duration of using face mask in a day. 65% health service providers wore facemask 8 to 12 hours in a day, 30% 4 to 8 hours and none wore less than 4 hours a day.

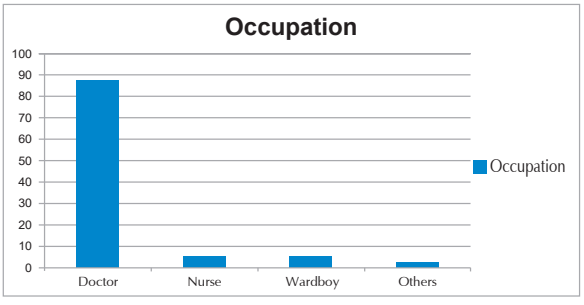


Figure-3: Distribution of the study population according to occupation (N=417). Out of 417 respondents, 88% were Doctor, 5% were Nurse, 5% were Ward boy and 2% were other health service providers.

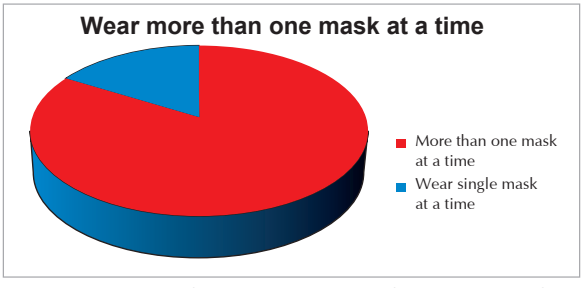


Figure-4: According to use more than one mask at a time (N- 417). 83% of the respondents wear more than one face mask at a time and rest 17% used single mask at a time

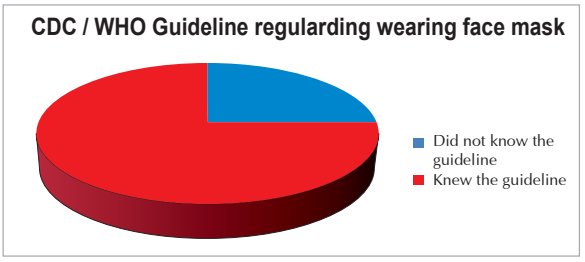


Figure-5: According to awareness of CDC/WHO guideline regarding using face mask. Among all respondents 25% health service providers were not aware of the guideline.

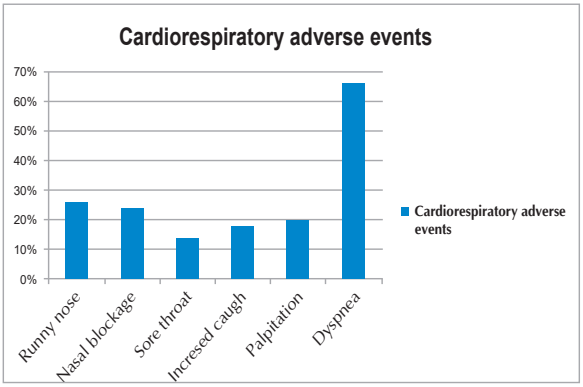


Figure-6: According to Cardiopulmonary adverse events. Among all respondents 66% experienced dyspnea, 20% palpitation, increased cough in 18%, 26% had runny nose, 24% developed nasal blockage and 14% experienced sore throat.

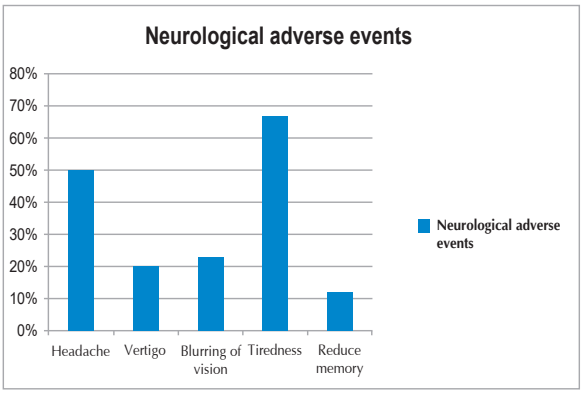


Figure-7: According to neurological adverse events. 50% respondents developed headache, 20% vertigo, 23% blurring of vision, 67% experienced tiredness and 12% noticed reduction of memory.

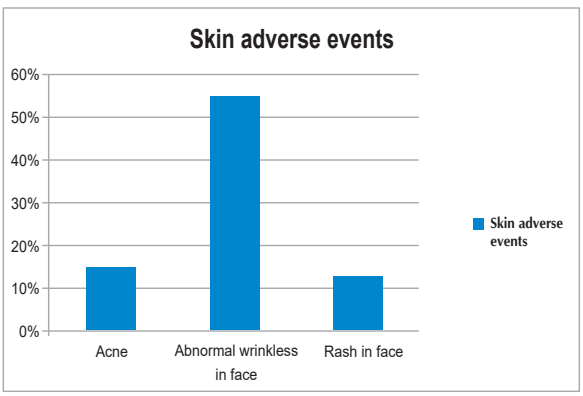


Figure-8: According to dermatological adverse events. 15% experienced Acne, 55% abnormal Wrinkles in face and 13% had rash in their face.

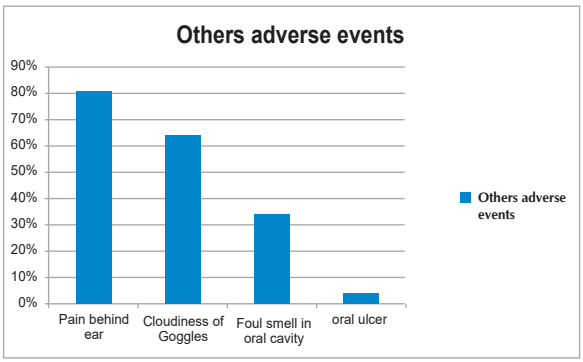


Figure-9: According to others adverse events. 81% health service providers developed pain behind the ear, 64% noticed cloudiness of goggles, 34% experienced foul smell in oral cavity and 4% developed oral ulcer.

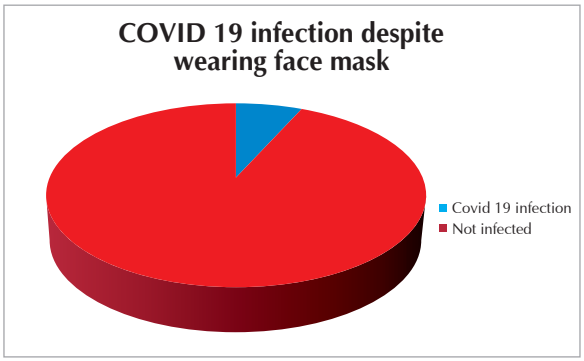


Figure-10: According to develop COVID 19 despite wearing face mask. 07% health service providers developed COVID 19 infection.

Discussion:

A profound number of health service providers who participated in this survey reported adverse events to prolonged face mask use during COVID 19 pandemic. Exertional dyspnea (66%), headache (50%), tiredness (67%), pain behind ear (81%), cloudiness of goggles (64%), abnormal wrinkles in face (55%), foul smell in oral cavity (34%) and acne (15%) were all recognized as common adverse effects. Similar distribution was also found in the study conducted by Rosner E et al who found headache in 71.4%, skin breakdown in 47.8% and acne in 11% respondents[1]. Terri Rebmann et al. reported many subjective symptoms like perceived shortness of breath, headache, light headedness, perceived exertion and impeded communication. CO2 levels increased from a baseline average of 32.4 at the beginning of the shift to 41 at the end

of each shift[14]. As we are still amidst the pandemic and second wave is predicted in future, tips and recommendations for enduring prolonged mask use are vital for health and comfort of health service providers.

Recommendations:

Frequent work breaks to be incorporated into work shifts to allow for shorter duration of mask use. More national concentrations is needed to improve training on using PPE among health service providers. Preventive measures like applying moisturizers, emollients and barrier cream to prevent skin breakdown. Improved mask design with a focus on safety, comfort and tolerability.

Conclusion:

More than two third health service providers used more than one mask at a time, about one fourth of them did not aware about face mask wearing WHO/CDC guideline and all respondents had experienced some sort of adverse events due to wearing face mask.

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