Original Article

Nursing strategic pillars to enhance nursing preparedness and response to COVID-19 pandemic at a tertiary care hospital in Saudi Arabia

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ABSTRACT

Background: COVID-19 pandemic caused enormous implications on the frontline staff. The objective was to share our nursing experience in responding to COVID-19 pandemic at a large hospital and its impact on nursing safety and healthcare services.

Methods: Six nursing strategic pillars were implemented. Pillar 1: establishing corona command centre. Pillar 2: limiting exposure by virtual care model, strict infection control measures, altered patient flow, active surveillance, and contact tracing. Pillar 3: maintaining sufficient supplies of personal protective equipment. Pillar 4: creating surge capacity by establishing dedicated COVID-19 units and increasing critical care beds. Pillar 5: training and redeployment of nurses and implementing alternate staffing models. Pillar 6: monitoring staff wellbeing, establishing mental health support hotline and clinic, providing hotel self-quarantine, and financial incentives.

Results: Out of 5483 nurses, 543 (10%) were trained for redeployment, mainly at acute and intensive care units. After serving 11,623 infected patient including 1646 hospitalizations during the first 9 months of the pandemic, only 385 (7.0%) nurses were infected with COVID-19. Out of them, only 10 (2.6%) required hospitalization, one (0.3%) required ICU admission, and none died. Although the number of patients hospitalized at our hospital during the current pandemic was 17 folds higher than the 2015 outbreak of middle East respiratory syndrome coronavirus, the hospital administration did not have to close the hospital as they did in 2015.

Conclusions: Proactive nursing leadership and implementation of multiple nursing pillars enabled the facility to maintain the safety of nursing workforce while serving large influx of COVID-19 patients.

Introduction

Since the first case in late 2019, more than 170 million patients were infected with coronavirus disease-19 (COVID-19) with 3.7 million deaths by the end of May 2021 [1]. The recorded number in Saudi Arabia during the same period was 450 thousand infections and 7500 deaths [2]. Severe acute respiratory syndrome coronavi-

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rus 2 (SARS-CoV-2) causes a variable clinical spectrum ranging from asymptomatic infection to severe pneumonia and life-threatening complications, specially with other comorbidities [3]. The emergence and spread of multiple new variants of SARS-CoV-2 represent a major challenge to stop the pandemic [4].

COVID-19 pandemic caused enormous implications on healthcare system, particularly on the frontlines such as nursing workforce [5]. They are at higher risk of exposure and infection than the rest of the community [6]. Additionally, they frequently suffer from burnout, psychological diseases, and sleep disturbance [7]. In addition, the large influx of patients to healthcare system result in heavy utilization of healthcare resources, specially intensive care units [8]. Nevertheless, the role of healthcare workers continue to be critical for the response to the pandemic [9,10]. They fight to get their job done while prevention spread of infection to patients, coworkers, and families [9,10]. They have to extend their working hours to respond to the high patient volume, get additional training so can serve critical tasks, and get familiar with remote education and telemedicine [9,10]. Additionally, they have to work while wearing full personal protective equipment [9,10].

Establishing nursing strategic pillars

Nursing leadership was engaged at the executive level on setting nursing strategic pillars to enhance nursing preparedness and response to the COVID-19 pandemic at various levels. The pillars represent a modification of nursing and healthcare transformation plans effectively used during and after controlling 2015 MERS-CoV outbreak [11,12]. Although the nursing pillars represent an extension of local nursing experience accumulated after the 2015 MERS-CoV outbreak [11,12], they were perfectly aligned with recommendations for efficient utilization and surge of nursing manpower during crisis [13,14]. Additionally, all measures taken to achieve these pillars were continuously monitored and modified to minimize the risk to nursing workforce, patients, and the system. The current paper will highlight nursing strategic pillars set and practiced during the COVID-19 pandemic at MNGHA hospital. Additionally, the impact of these pillars on nursing safety and healthcare services will be discussed.

Strategic pillar 1: coordination, command and control

Leadership and in place response plan is critical to sustain health workforces during the time of pandemic [15]. Therefore, the Ministry of National Guard Health Affairs at Riyadh (MNGHA) established a multidisciplinary Command & Control Centre at early stage of the pandemic before the first COVID-19 case was announced in Saudi Arabia. The main role of the command center was to ensure informed decision-making, effective collaboration, advanced coordination, as well as building clear and timely communication process. The command center and major healthcare transformation measures were used by the MNGHA administration in 2015 to effectively control one of the largest and deadly outbreaks of Middle East Respiratory Syndrome Coronavirus (MERS-CoV) in the world [12,16]. As many healthcare institutions in Saudi Arabia, previous experience with MERS-CoV strengthened MNGHA's ability to manage emerging infectious disease outbreaks [17,18]. Weekly virtual meetings were conducted by all stakeholders including; hospital administration, infection control & prevention (ICP) department, nursing services, healthcare technology management services (HTMS) and other support services. The Command center published the infectious disease epidemic plan (IDEP). The plan has been updated on regular bases according to the progression of the COVID-19 pandemic within the country as well as the recommendations of the Saudi Centre of Dis-

eases Control (SCDC) and the Ministry of Health (MOH) National Crisis Management Committee directives.

Strategic pillar 2: safety & security

To ensure patient and healthcare safety as well as appropriate risk management, MNGHA swiftly moved into implementing strict safety measures at an early stage during COVID-19 pandemic. The aim was to minimize the exposure and reduce the transmission of infection among patient and healthcare workers. Nurses were diligently involved in decisions and implementations of these safety measures, to reinforce their role in COVID-19 response [19].

Several measures were implemented to minimize the exposure and reduce the transmission of infection among patient and healthcare workers. MNGHA proactively adopted a virtual care model in outpatient clinical settings to decrease the crowds and ensure safety of patients and healthcare workers. A comprehensive surveillance system was established to detect and early manage as many cases as possible. Therefore, dedicated COVID-19 contact tracing clinics for the staff and the public were established outside the hospital building. The Medical Simulation Center at King Saud bin Abdulaziz University for Health Sciences (KASU-HS) which is a MNGHA-affiliated University building outside the hospital was used for that purpose. Immediate isolation of all suspected and confirmed cases was done in the hospital or quarantine facilities to prevent further infection transmission. Altered patient flow were established at each stage of care, including triage, screening, and referral into acute-care clinical settings

All staff underwent temperature and symptoms monitoring at the beginning of the shift. Staff who presented with fever or symptoms of Acute Respiratory Illness (ARI) were referred to employee health clinic immediately. Staff with a history of COVID-19 exposure were swabbed and remained in isolation while waiting for the result. Staff with a positive result were subject to fourteen-day quarantine. COVID-19 positive staff were followed up by public health department via virtual clinic to assess their health condition. Staff who still had respiratory symptoms after the quarantine period were sent physically to the employee flu clinic for clearance. In order to comply with the government rules, the hospital leadership granted special leave for staff who were at risk of COVID-19 infection, including comorbidity and pregnancy.

Infection control measures were strengthened, including universal masking practices for all staff in the clinical units and no visitor/sitter policy. Elective nasopharyngeal swabbing for all hospital admissions, followed by segregation of patients with negative COVID-19 results from those with pending results. Patients were allocated into two types of admitting units, non COVID-19 units to admit patients without COVID-19 infection and COVID-19 units, where patients with COVID-19 infection were admitted. Patients who were admitted into shared rooms were always encouraged to wear face masks. In addition, hemodialysis patients were encouraged to wear face masks during the entire duration of dialysis session. MNGHA continued to provide urgent medical care for acute conditions to mitigate the risk of healthcare-associated infection.

MNGHA implemented additional environmental safety measures including, establishing an ARI screening checkpoints at all hospital entrances, increasing number of security personnel and ensuring hygiene of clinical units. Physical distancing precaution were applied in all staff lounges, patients waiting areas, registration receptions, hospital corridors and elevators.

Strategic pillar 3: logistics and supply management

One of the major challenges across the globe caused by this pandemic was the shortage of personal protective equipment (PPE) [20,21]. Several strategies have been suggested to overcome the PPE

shortage including; manufacturing own PPEs from domestic materials such as fabrics for masks and plastic bags for gowns, extending the life of available PPEs, and reducing nonessential services [22]. Fortunately, the MNGHA was able to maintain required essential PPE supplies to ensure that staff caring for patients always had the highest level of protection. The ability to maintain these supplies throughout the surge of COVID-19 cases has had a major impact on the organization's ability to manage resources safely and effectively during the outbreak. MNGHA command center established a robust mechanism to ensure availability of COVID-19 supply at all clinical units, with a focus on reducing nosocomial infection between patients and healthcare workers. The aim was to ensure that the organization is able to maintain its workforce with minimal impact from sick leaves and quarantines due to unprotected exposure. In addition, to maintain physiological well-being of the frontline staff, which has a positive impact on morale. Staff who are protected are more confident in delivering care and therefore willing and able to deliver better care [23].

Nurses were represented in a taskforce committee who worked closely with the nursing products team to facilitate the supply of COVID-19 PPE to all targeted clinical areas. Following the MERS outbreak in 2015, MNGHA mandated attendance for all clinical staff of PPE sessions. The focus of these sessions were to improve understanding of the different levels of isolation (e.g. contact, droplet, and airborne isolation), improve understanding of required PPE to manage different levels of isolation, and to demonstrate the correct process for donning and doffing of PPE. Additionally, all clinical staff were also mandated to attend N95 fit testing program every two years. Staff who failed the fit testing using different sizes of masks were referred to Powered Air Purifying Respirator (PAPR) training to ensure that clinical teams were clear on the correct and appropriate respiratory PPE usage.

During this pandemic, MNGHA centralized the management of PPE resources through a central tracking and distribution system. Detailed daily reports were circulated to all stakeholders, reporting on PEE availability and usage. These reports were discussed at the Command Centre to take decisions on implementation of alternate strategies, such as extended use. The later was based on the US and Saudi Centers for Disease Control and Prevention (CDC) [24,25], the US Food and Drug Administration (FDA) [26], the Saudi Food and Drug Administration (SAFDA) [27] and MOH guidelines [28]. These strategies helped MNGHA to ensure a continuous supply for its frontline healthcare workers in an exceedingly difficult global supply environment.

Strategic pillar 4: creating surge capacity

Once a healthcare organization is unable to meet the needs of patients with existing resources, the creation of surge capacity is a must [29]. There are three essential components to surge capacity i.e. staff, equipment and structure. Nursing preparedness plan focused on equipment and structure, more specifically creation of additional bed capacity using various strategies. It focused on the strategic management that aims to accommodate the increased surge capacity and facilitate the seamless admission/transfer of confirmed and suspected COVID-19 cases into appropriate units. Empirically, the idea is to prevent cohorting two different groups of patients in order to avoid cross contamination [30].

In both MNGHA and Saudi Arabia, the highest prevalence of confirmed COVID -19 cases was observed during the months of May and June 2020 [31]. As the number of COVID-19 patients increased, the demand for beds comparably increased, resulting in the need for the already planned surge capacity. In order to meet this need, 8 critical care units (124 beds) and 10 acute care units (246 beds) were designated as COVID-19 units, separated into units for either confirmed or suspected cases. Since the MERS outbreak in 2015 and

prior to the COVID-19 pandemic, MNGHA had one critical care unit (8 beds) and one acute care unit (29 beds) dedicated for patients with acute respiratory illnesses. Creating capacity for critical care beds, required reconstruction of wards to facilitate the complex care and equipment required. Furthermore, multiple negative pressure rooms were created in all the designated COVID-19 units. Where this was not possible, high-efficiency particulate air filters were used. Entrances to these units were restricted and all staff were screened for temperature and any acute respiratory illnesses prior to be allowed entry.

Another used strategy to increase the surge capacity was to suspend elective admissions, day cases and surgeries. Previous experience with influenza pandemic pointed that this strategy may not be enough as the increasing admissions would exceed the reduction created by these measures [32]. This proved to be the case in MNGHA, however this challenge was met with the establishment of quarantine hotels. Collaboration between MNGHA's Corona Command Center and regional bodies led to the establishment of interim hotel accommodation to "cured" COVID-19 patients who did not require long-term hospitalization.

Strategic pillar 5: nursing workforce planning

Workforce planning is a critical element in preparing for uncertainty in times of a pandemic such as COVID-19 [33]. At MNGHA, the focus for nursing leadership included strategies for optimizing staffing resources, maintaining staff safety and resilience and the efficient provision of evidence-based care. The strategies employed included; the training and redeployment of nursing staff, implementation of alternate staffing models, adjustment of nurse to patient ratios (NPR) and scheduling patterns, introduction of extended hours for senior nursing leadership, monitoring nursing absenteeism, and facilitating return of stranded staff.

During the pandemic, 543 (10%) out of 5483 nurses were trained for redeployment at MNGHA. This was accomplished through a step by step process; first identifying alternate internal sources of staffing, followed by identifying the knowledge, skills and practice gaps required for the staff for each of the different training programs. Focused training programs were then developed that were tailored to what was required to ensure that nurses were appropriately trained for the specialty area that they would be redeployed to [34]. The training programs included ICU training (294 nurses), high-dependency unit (HDU) training (55 nurses), acute care unit training (113 nurses) and pediatric ICU cross training (81 nurses). In addition to the focused training programs, 1144 nurses were trained to perform nasopharyngeal swabbing to ensure the testing procedure was done competently and safely. Training also included reinforcement of knowledge of COVID-19 symptoms, the prevention of transmission of infections and other important clinical information. It also included an overview of the IDEP with regular updates on MOH COVID-19 guidelines.

While the surge capacity secondary to infectious disease is a unique strategy to mitigate staffing shortages [35], the partial relief produced has been challenged by many other factors that had direct impact on the availability of staffing resources. These included nursing staff stranded outside the country due to worldwide travel bans, special leave granted to nursing staff with medical conditions who were at higher risk of getting COVID-19 infection, leaves for COVID-19 positive nursing staff, and leaves related to development of symptoms. Nursing leaders closely monitored these challenges and tried to solve. They extended efforts to facilitate the return of 250 of the 300 stranded staff. Additionally, all leaves were suspended for a period of time, with the exception of local leaves for emergency purposes.

When nursing staff are redeployed during a crisis, they are usually required to work in unfamiliar work environments that fall
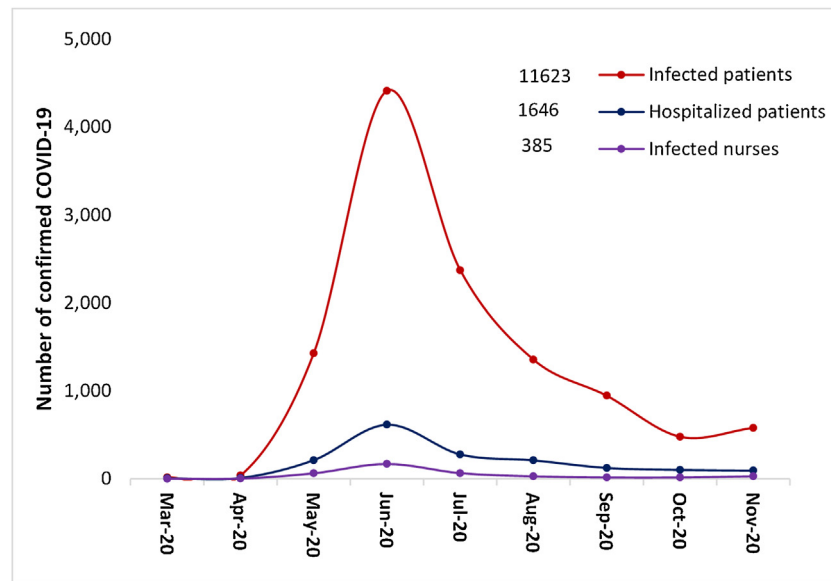
Fig. 1. Epidemic curve of confirmed COVID-19 infection in nurses compared with patients at MNGHA (2020).

outside of their scope of practice. Consequently, team-based capability may be more practical and efficient than individual-based capability [36]. For redeployment during the COVID-19 pandemic, nursing services opted to change from a primary nursing care model to a hybrid model including functional nursing in some of the units. This allowed for efficiency in patient care as the nurses had a clearly defined task that they could accomplish in a short period of time. The redeployed nurses worked at the direction of charge nurses, tasked with patient care activities within their competence. The critical care units developed a team-based approach for critical care patient management, where a group of redeployed staff was supervised by a critical care nurse. This allowed for the best use of the unique skill sets of each team member, providing efficient critical care to patients collaboratively. During the COVID-19 pandemic, nurse to patient ratios were adjusted to provide an appropriate base staffing. This was augmented with float staff on a shift by shift basis. Adjusted working patterns, such as assigning shorter shifts (8-h as opposed to 12-h) and overtime utilization were also considered, in an effort to balance workloads and to reduce stress.

One of the challenges of any crisis is rapidly changing situations that require real time decision making and staff support. In order to mitigate this challenge, directors of nursing and nurse managers worked extended hours during the weekday as well as weekends. Critical care managers provided a 24-h on-site presence, providing support to critical care units. This ensured that staff received direction based on real time decisions. Additionally, they received support when needed, regular updates regarding COVID-19 status, updates regarding operational changes, responses to safety concerns, and other issues related to surge capacity.

Strategic pillar 6: nursing staff wellbeing

In most health care organizations across the globe, during a pandemic such as COVID-19, the focus is to ensure capacity and workforce to deal with the overwhelming surge in patient numbers. On the other hand, the pandemic impact on mental health of frontline staff often takes a back seat [29]. Therefore, it is crucial for nursing leaders to anticipate the stressors and understand the sources of anxiety and fears that the frontline staff may experience during a pandemic [37,38]. To this end, a staff wellbeing survey was conducted at MNGHA on April 2020. Nursing staff represented 42.5% of the 11,319 respondents. The result revealed that 22% of

nurses were at risk of developing post-traumatic stress disorders; 21% were at risk of developing anxiety and 19% were at risk of developing depression. Furthermore, the survey revealed that 31% considering quitting their jobs or changing their career. In response to the findings of this survey, a nursing wellbeing program, "Well Resilient Nurse" was established at a corporate level to promote staff wellbeing and prevent staff anxiety, stress, and burnout.

Nursing services implemented different strategies to promote and maintain the wellbeing of nursing staff. These included (a) the provision of mental health support in collaboration with the Mental Health and Quality Improvement Departments, (b) the facilitation of stress reduction strategies and self-efficacy, (c) the enhancement of transparent communication between leaders and frontline nurses and (d) the acknowledgment of nurses' contributions despite personal anxiety and concerns.

Various strategies were implemented to provide psychological and emotional support to nurses at all levels. These included; the establishment of two virtual employee wellness clinics, an employee wellbeing hotline, online peer support groups, a nurse manager support group and a dedicated stress management and wellbeing program. The peer support group provided opportunities for frontline nurses to discuss different topics and strategies to cope during the epidemic. Additionally, it allowed them to connect with one another and share thoughts, feelings and ideas about life during the pandemic. The nurse manager group provided clinical unit leaders with skills and strategies to support their staff and allow them to share their experiences.

MNGHA leaderships expressed their acknowledgment and appreciation for nurses for their commitment and willingness to continue serving despite the risks brought by the pandemic. This was in the form of "Thank you" letters, meal distributions to the COVID-19 units, improvements in living conditions in employee compounds, and care for COVID-19 positive health professionals during quarantine. Additionally, MNGHA provided hotel accommodation for staff who believed that they could not effectively self-isolate or quarantine at home. Furthermore, MNGHA ensured that staff have financial peace of mind through measures such as paid time off, consideration of special pay, and the provision of job security to staff stranded in home countries due to travel restrictions.

Keeping nursing staff protected from chronic stress and poor mental health during this crisis means that they will have a bet-

ter capacity to fulfill their roles [37]. Currently, most organizations have passed the initial impact of the COVID-19 pandemic and the heroic phase that immediately follows [39]. Staff are now going through emotional downslope of the disillusionment phase [39]. This phase could last for months or even longer before it gradually transforms into a recovery phase. Therefore, the focus should be on the long-term mental wellbeing capacity of the frontline nurses.

Impacts of nursing strategic pillars

In addition to sharing the nursing experience in dealing with the pandemic, it may be helpful to share some of its impact on nursing safety and healthcare services. However, lack of control group and multiple nature of the interventions challenge any tested impacts. Yet, the infection control data showed that nurses at MNGHA were doing very well while serving large influx of sick patients. For example, after serving 11,623 infected patient including 1646 hospitalizations, only 385 (7.0%) nurses were confirmed with COVID-19 during the first 9 months of the pandemic (Fig. 1). As expected, the peak of infection coincided with patient infection and hospitalization (Fig. 1). Out of the 385 infected nurses, only 10 (2.6%) nurses required hospital admission, one (0.3%) nurse required ICU admission, and none died. The current infection rate was better than reported in meta-analysis studies, where infection rates ranged between 10% and 11% among healthcare workers globally during the first 6 months of the pandemic [40,41]. Similarly, the current hospitalization and ICU admission rates was much lower than reported before in the US (8% and 2%, respectively) [42,43]. With the exception of elective admissions/surgeries, MNGHA services were maintained during the pandemic. Although the number of patients served and hospitalized at MNGHA during the current pandemic was approximately 90 and 17 folds (respectively) higher than the 2015 MERS-CoV outbreak, MNGHA administration did not have to close the hospital as they did in 2015. As mentioned above, the nursing pillars considerably improved the surge capacity and the training of staff. For example, 8 critical care units (124 beds) and 10 acute care units (246 beds) were designated as COVID-19 units. Additionally, 543 (10%) out of 5483 nurses were trained for redeployment at MNGHA.

Conclusion

The COVID-19 pandemic has challenged the healthcare system at multiple levels. Our experience showed that proactive nursing leadership and implementation of the proposed nursing strategic pillars enabled the facility to maintain the safety of nursing workforce while serving large influx of COVID-19 patients.

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Competing interests

None declared.

Ethical approval

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