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Implications for COVID-19: A systematic review with meta analysis of nurses experiences of working in acute care hospital settings during a respiratory pandemic

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Abstract---Aim: To carry out systematic review and meta-analysis of experiences of nurses working during respiratory infection pandemic in hospitals providing management of the acute conditions. Background: The major portion of the health professionals working as the main frontline workers in COVID -19 pandemics and other respiratory pandemics are constituted by nurses. In recent literature there has been evaluation of the increased risk among health workers. But very few studies have been put forward which have provided data especially regarding risk among the nurses irrespective of the other health activists and analysed the experience of nurses regarding their involvement in the pandemic. Review Results: The systematic and meta-analysis contained reports from 15 qualitative research including 397 nurses. The study was primarily phenomenological in nature. The majority of the nurses were female and between the ages of twenty to fifty years. The review and meta-analysis included 136 findings of the study, 111 of which were unambiguous and 25 of

which were convincing. The nursing teams offered high-quality care despite facing significant emotional, social and physical consequences, and lack of responsiveness of formalised managerial reaction. Conclusion: It can be concluded that nurses play a critical role in the medical response to pandemics and outbreaks of infectious diseases. During and after a pandemic or epidemic, nurses require active support from governments, policymakers, and nursing organisations according to this systematic review and meta-analysis. Nurses who do not receive this care are more prone to develop serious psychological problems, which can lead to burnout and departure from the profession. Clinical significance: Accounting for the majority of the nursing employment, female nurses were well-represented in the research examined. As a result, the experiences described in the review and meta-analysis may not be indicative of male nurses.

Keywords---COVID-19, Nurses, Respiratory pandemics.

Introduction

There are several consequences of pandemics over the systems of health care especially the human workforce. Epidemics and pandemics involving the infections of respiratory system like COVID -19 are more contagious because these infections spread rapidly through the air borne droplets and contact among the persons. The major portion of the health professionals working as the main frontline workers in COVID -19 pandemics are constituted by nurses.^[1-3]

Nurses are at the maximum risk of getting infected from these viruses because they are exposed directly to these viruses. In order to provide health care facility directly to affected individuals, nurses come in close contact with the patients making them more vulnerable to COVID-19 and other viral infection. It has been reported that there were death of seventy people during the outbreak of SARS virus in Taiwan. Among these seventy death, four were nurses. It has been further reported that percentage of frontline health workers getting infected during COVID 19 is much higher than previous respiratory virus pandemics.^[4-6]

Nurses have professional responsibility to work for care of the human community in the condition of pandemics, however there are concerns among the nurses regarding their duties. Besides they feel that their intense duty during the pandemic is having a serious impact over their personality. Nurses have expressed several problems related to their duty during the pandemic. These included increased probability of getting infected, increased probability of transfer of infection from them to members of their family, fear regarding the loss of job and severe sanctions on their personal autonomy.^[7-10]

These problems are further aggravated by the problems related to the deficiency and irregular supply of PPE kits during pandemics alongwith deprivation of other vital materials and resources required to maintain the proper supply chain. It has been observed that nurses have suffered psychosocial problems due to their clinical duties in acute care hospital settings in this pandemic. They have suffered

from increased stress due to their prolonged alienation from their family, deprivation of sleep, massive workloads due to shortage of adequate staff and high demands from the healthcare system.^[11-14]

In recent literature there has been evaluation of the increased risk among health workers. But very few studies have been put forward which have provided data especially regarding risk among the nurses irrespective of the other health activists and analysed the experience of nurses regarding their involvement in the pandemic.^[15-19]

Therefore, this systematic review and meta-analysis have been put forward with the objective of analysis of experiences of nurses working during respiratory infection pandemic in hospitals providing management of the acute conditions.

Methods and Materials

To consolidate evidence of nurses' experiences during a pandemic or epidemic, a systematic review and meta analysis was conducted. The criteria of the Joanna Briggs Institute (JBI) were used to guide the systematic review and meta analysis (Aromataris and Munn, 2017). The review was reported using the PRISMA systematic review reporting checklist.

Inclusion criteria

Those published papers were selected which fulfilled following criterion:

- Papers which reflected only the experiences of nurses in the respiratory pandemics in acute care hospital settings during a respiratory pandemic
- Papers which included the suitable subjects in their study having no systemic diseases
- Papers which were published in English language only.

Exclusion Criteria

Those papers were not selected which were having following features:

- Papers which focussed experiences of nurses along with other health professionals during respiratory pandemics.
- Those literatures published in formats which were non commercial in nature like abstract of conference.
- Papers published in language other than English

The definition and declaration provided by WHO was used to classify the pandemic or epidemic. The pandemic or epidemic included were Severe Acute respiratory Syndrome (SARS), Middle East Respiratory Syndrome Coronavirus (MERS-CoV), H5N1 and H1N1. The studies which evaluated the nurses performing their duties in community health centres during the pandemic were not included. Those studies analysing the experiences of nurses in the Ebola virus outbreaks were also not included because Ebola has not been considered as a respiratory viral epidemic or pandemic. Besides the mode of spread of this virus is different from other respiratory pandemic virus.

Literature research

A detailed and extensive search was performed with the help of keywords nurses, respiratory pandemic, acute disease management, hospital settings. There was extensive literature search in reliable and authentic databases like Pubmed, Scopus, Web of Sciences, Ovidsp, Cochrane Library for obtaining papers focussing on experiences of nurses in acute care hospital settings during respiratory settings from 2000 till 2021.

A total of 137 papers were found. After that 72 papers were removed which were similar or duplicate articles. Initially there was selection of 65 distinct papers. Then after there was reviewing of abstracts and titles of papers. 47 papers were excluded after this review. Finally 18 papers were selected which completely fulfilled the inclusion criterion and exclusion criterion. Then complete text of these 18 papers was managed. 03 more articles with full text were obtained from the references of the article. Final review was carried out and six more papers were eliminated. Hence finally 15 articles with full text were included for this systemic review and meta analysis. (Figure 1)

Data extracted

During the systemic review and meta analysis data were obtained concerning the following parameters. Authors and the year of publication, design of study, number of nurses included in the study, age of nurses, clinical experience of nurses, country where study was carried out, percentage of females among the study population, various experiences of nurses working acute hospital settings during the respiratory pandemic. (Table 1).

The appropriate qualitative research data of the included publications were verbally extracted, with a subject quotation included to corroborate and clarify the interpretation of the observation. The qualitative research data were categorised as unambiguous, convincing, or unsubstantiated using the JBI Levels of Credibility (Munn et al., 2014). The meta-analysis technique was used to combine the findings. This technique entailed gathering information from separate studies somewhere at subtheme level, then categorising them based on their closeness in interpretation. On the basis of this, a single comprehensive set of synthesised outcomes that can be used as a foundation for therapeutic practise was developed.

Statistical analysis for meta analysis

IBM SPSS version and fourteenth version of Microsoft Excel was used for carrying out systemic review analysis. Difference among the means of groups were represented with t-test confidence intervals while difference among the population was represented by chi squared confidence intervals (95% CI).

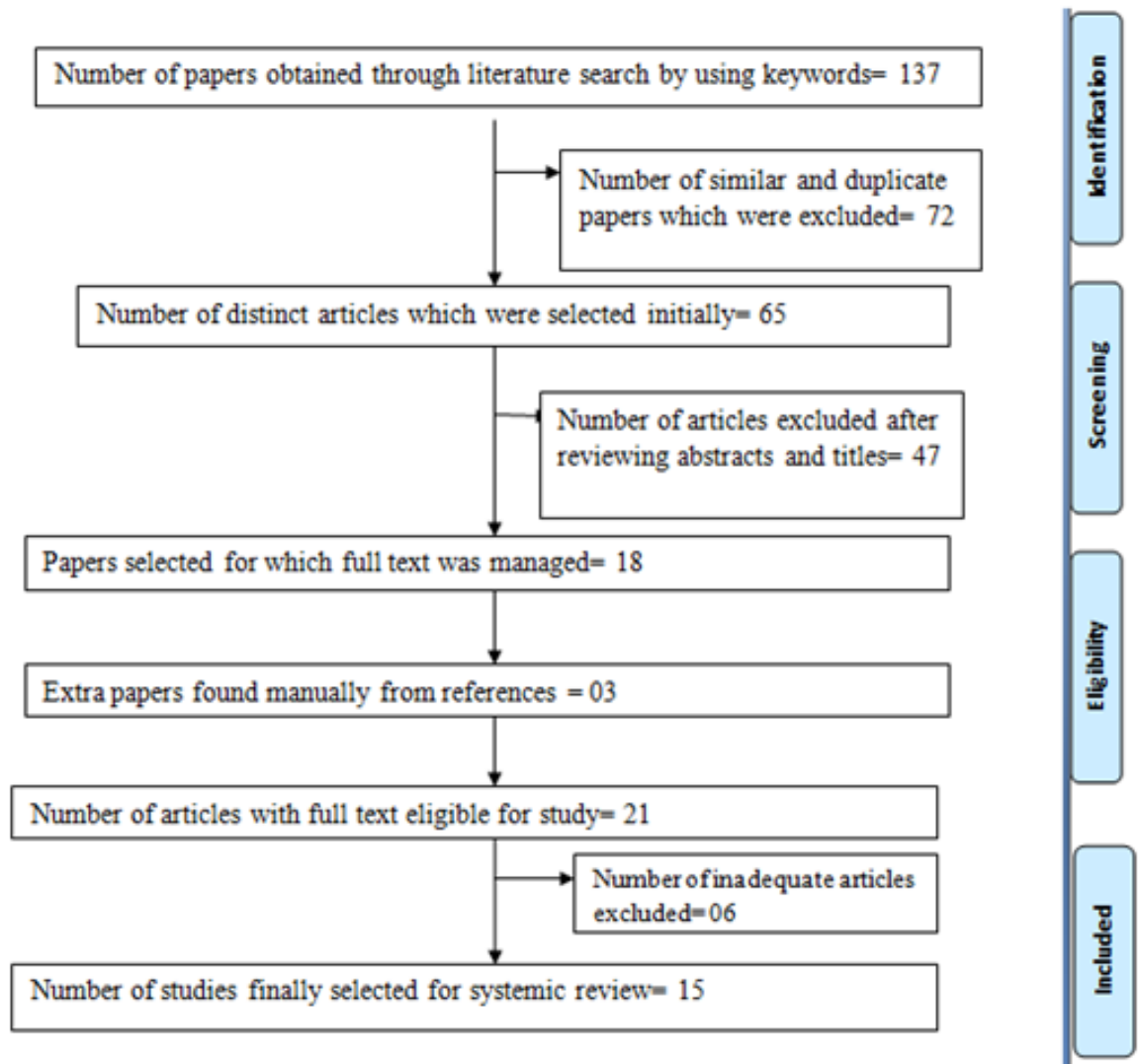


Figure 1: PRISMA flow diagram for the identification and selection of eligible studies in this review and meta analysis

Results

The review and meta-analysis contained reports from 15 qualitative research including 397 nurses. The study was primarily phenomenological in nature. The majority of the nurses were female and between the ages of twenty to fifty years. The length of time spent on the job varied from three months to forty three years. Hong Kong, Taiwan, South Korea, Australia, and Singapore all performed research. The research was carried out in a variety of hospital settings, including critical care units also including emergency wards. (Table1)

The review and meta-analysis included 136 findings of the study, 111 of which were unambiguous and 25 of which were convincing, which were grouped into seven groups based on semantic similarities. Three synthesis conclusions were created based on these categories: supportive nursing teams offering high-quality care, recognising the emotional and physical consequences, and responsiveness of formalised managerial reaction.

In this review and meta-analysis two characteristics of supportive nursing teams that provide quality care were identified: feel of duty, commitment to treating patients, and selfless sacrifice; and occupational collaboration. It was observed that, nurses felt a strong level of professional responsibility to serve patients during a pandemic, regardless of the situation. Nurses saw working in tough times and in dangerous conditions as part of their job and a professional responsibility. Nurses' determination to carry out their responsibilities throughout a pandemic, notwithstanding the risk of infection, demonstrates their dedication to the care of patient. Nurses also engaged them in acute management to cope with their anxiety and stress in a constantly evolving and changing workplace. This occupational devotion, on the other hand, produced a moral and ethical problem for nurses, who felt compelled to choose between patients and family obligations. Due to the separation from family and friends, this selfless sacrifice led to social alienation.

It was observed in this systemic review and meta-analysis that nursing co-workers functioning during such a pandemic had a high level of professional bonding. Nurses recognised the value of looking after their co-workers and distributing the workload. Several nurses compared the experience to operating on a battleground, where they had to collaborate effectively to keep each other safe. Communicating their experiences, desire to work together, and establishing a spirit of teamwork displayed their appreciation for their nursing colleagues.

Worries for family and personal safety, as well as anxiety, helplessness, and psychological disorders in the midst of disaster, were used to acknowledge the emotional and physical consequences. Nurses exhibited increased anxiety about their own wellbeing whilst looking for people with the disease during such pandemic, which is unsurprising. Fear of the new event, as well as the threat of death, fuelled people's concerns about their own susceptibility to infection. Nurses were concerned not only about being exposed to ill patients, but also about infection spreading among nursing colleagues who shared resources. Aside from their own safety, nurses were concerned that the unpredictability of the workplace and the mysterious disease danger were putting their friends and family at risk of contamination. Nurses were especially concerned about infecting susceptible members of the family like the geriatric, immunocompromised, and small children. Protecting family members was seen as a highest concern, with certain nurses opting for self-isolation as a safety measure. (Table 2)

Nurses who worked during such a pandemic experienced psychological discomfort and worry as a result of their sense of personal, social, and financial ramifications from the unpredictability of a pandemic. Nurses may feel exposed and concerned about future lawsuits stemming from the necessity to balance resources and patient requirements in a situation when they were forced to limit and deny care

to certain patients. Nurses felt powerless because they were under a lot of stress and worried that their practices would be harmed by work pressures and public fear caused by the pandemic. Despite their professional friendship, nurses felt alone and frustrated due to the lack of familiarity of the pandemic atmosphere. Furthermore, caregivers of patients were observed expressing their feelings onto the nurses. Being unable to control flow of patients resulted in both physical and mental exhaustion. As a result of the epidemic, deaths amongst their nursing colleagues brought uncertainty, anxiety, and stress. Safety and protection, communication and knowledge, and organisational preparedness - provision of proper leadership, staffing, and policy - all contributed to the responsiveness of systematised, organisational reactions

Nurses' anxieties and fears about functioning amid pandemics were exacerbated by a reported lack of tactical resources (PPE). Many nurses' capacity to cope was harmed by the ambiguity about whether the level of protection provided to nursing personnel was effective and efficient in reducing infection risk. Other nurses complained that there was inconsistent information and a lack of consensus on the best infection control practises. Despite insufficient PPE supplies in certain institutions, nurses showed their tenacity by teaming with coworkers to devise alternate protection, with some opting for disposable raincoats.

The level of stress among healthcare staff escalated as advice and information about the infection changed rapidly. Several nurses wanted to make sure they had all of the information they needed to offer excellent patient care.

Nurses, on the other hand, complained about a lack of expertise in caring for patients with a developing infectious disease. Because the infectious agent was so new, changes to regulations and guidelines were made quickly, causing confusion over which editions were the most up-to-date. Nurses' anxiety and risk perceptions were amplified by this ambiguity. Information was frequently perceived as difficult and insufficiently communicated, causing extra confusion and anguish among the already overworked nurses.

The level of occupational and institutional preparedness for the pandemic had a significant impact on frontline nursing workers. Staffing shortages were one of the key factors affecting nurses' capacity to handle with the rigorous workload during the epidemic. Due to a staffing shortage, achieving an acceptable interprofessional collaboration for managing high-acuity patients was difficult, putting strain not only on relatively junior personnel but also on senior staff who had to support them. Due to the increasing demand on the nursing industry, nurses were forced to adjust to changes fast, frequently in less than ideal settings, such as significant patient turnover and a lack of isolation rooms. One of the most difficult aspects of working as a nurse during the pandemic, according to nurses, was a lack of additional assessment at both the treatment and health department levels. The results of meta analysis showed 95% CI values for different experiences of nurses which were as follows: emotional stress (-66.15, 85.98), anxiety (0.33, 7.32), sleep deprivation (-31.38, 34.55), professional stress (-3.68, 4.61), excessive workload (-1.26, 2.81), negative impact on clinical performance (-26.47, 32.61), pressure of reduced supply of PPE (-1.66, 3.64), fear of getting infected

(-10.25, 13.87), fear of transmission of infection to family members (-1.18, 1.22), thinking of leaving jobs (-1.18, 2.76). (Table 2, figure 2,3,4). When there was analysis of risk of bias then it was observed that Chung et al had low risk of bias. On the other hand Wong et al , Lam & Hung , Koh et al . , Ives et al , Corley et al and Chiang et al. showed unclear risk of bias. There were studies like Shih et al , Liu & Lehr , Holroyd & McNaught which showed high risk of bias. (Table 3)

Table 1: Important Characteristics of Included Studies.

Authors and year of publication	Number of the study subject	Country of study population	Years of clinical experience	Range of age in years	Percentage of females	Design of study	Important results
Chiang and associates in year. 2007	Twenty one	Taiwan	6 months to eighteen years	21 -43	100%	Phenomenology	Psychosocial problems
Chung and associates in year (2005)	Eight	Hong Kong	6 months to fourteen years	21-40	50%	Phenomenology	Emotional stress, deprivation of sleep
Corley and associates in year 2010	Eight	Australia	Not calculated	Not calculated	Not reported	Phenomenology	Anxiety, massive workload
Holroyd & McNaught in the year 2008	Seven	Hong Kong	Four to twelve	Not reported	100%	Qualitative	Fear of transmission of diseases to family members; negative impact on their performance
Ives and associates in year 2009	Twelve	United Kingdom	Not calculated	Not calculated	Not calculated	Qualitative	.Depression, lack of motivation.
Koh and associates in. 2012)	Ten	Singapore	Seven to forty three years	Not reported	Not reported	Qualitative	Living in the environment of increased risk of getting infected
Lam & Hung in year 2013	Ten	Hong Kong	One year to twenty year	20 - > 40	100%	Qualitative	Professional stress due to lack of supply of PPE and other resources. Worries about health, criticisms of the administration, and professional views.
Liu & Lehr in year 2009	Six	China	One year to twenty one year	24-41	Not reported	Qualitative	Retardation in the self growth of nurses.
Shih and	Two	Taiwan	Three to five	20-50	96%	Qualitative	Threat to their life

Authors and year of publication	Number of the study subject	Country of study population	Years of clinical experience	Range of age in years	Percentage of females	Design of study	Important results
associates in year. 2007	hundred		years				in taking care of the SARS patients.
Wong and associates in year. 2012	Three	Hong Kong	Seven to sixteen years	31-37	66.6%	Qualitative	Increased vulnerability of losing jobs. .

Table 2: Data obtained after meta analysis of occlusal outcomes

Experiences of nurses	95% prediction	Effect	tau ² (95% CI)	P	n	I ² (95% CI)
Emotional stress	-66.15, 85.98	MD: 9.91 (3.62, 16.21)	25.52 (3.01, 507.80)	0.002	3	84% (38%, 99%)
Anxiety	0.33, 7.32	RR: 1.56 (1.23, 1.98)	0 (0, 0.55)	0.001	3	0% (0%, 91%)
Sleep deprivation	-31.38, 34.55	MD: 1.59 (-1.05, 4.22)	4.93 (0.71, 95.19)	0.24	3	91% (60%, 100%)
Professional stress	-3.68, 4.61	MD: 0.46 (-0.18, 1.10)	0 (0, 2.52)	0.16	3	0% (0%, 88%)
Excessive workload	-1.26, 2.81	MD: 0.78 (0.46, 1.09)	0 (0, 3.77)	<0.001	3	0% (0%, 94%)
Negative impact on clinical performance	-26.47, 32.61	MD: 3.07 (0.57, 5.57)	3.78 (0.24, 79.63)	0.02	3	79% (19%, 99%)
Pressure of reduced supply of PPE	-1.66, 3.64	MD: 0.99 (0.58, 1.40)	0 (0, 7.24)	<0.001	3	0% (0%, 94%)
Fear of getting infected	-10.25, 13.87	MD: 1.81 (0.64, 2.98)	0.54 (0, 17.35)	0.002	3	50% (0%, 97%)
Fear of transmission of infection to family members	-1.18, 1.22	MD: 0.02 (-0.16, 0.21)	0 (0, 0.74)	0.82	3	0% (0%, 89%)
Thinking of leaving jobs	-1.18, 2.76	MD: 0.79 (0.49, 1.10)	0 (0, 0.65)	<0.001	3	0% (0%, 89%)

Physical stress affecting body health	NC	MD: -0.03 (-2.02, 1.96)	1.72 (0, 258.55)	0.98	2	83% (0%, 100%)
Lack of motivation	-19.88, 16.36	MD: -1.76 (-3.62, 0.10)	1.13 (0, 42.78)	0.06	3	41% (0%, 96%)

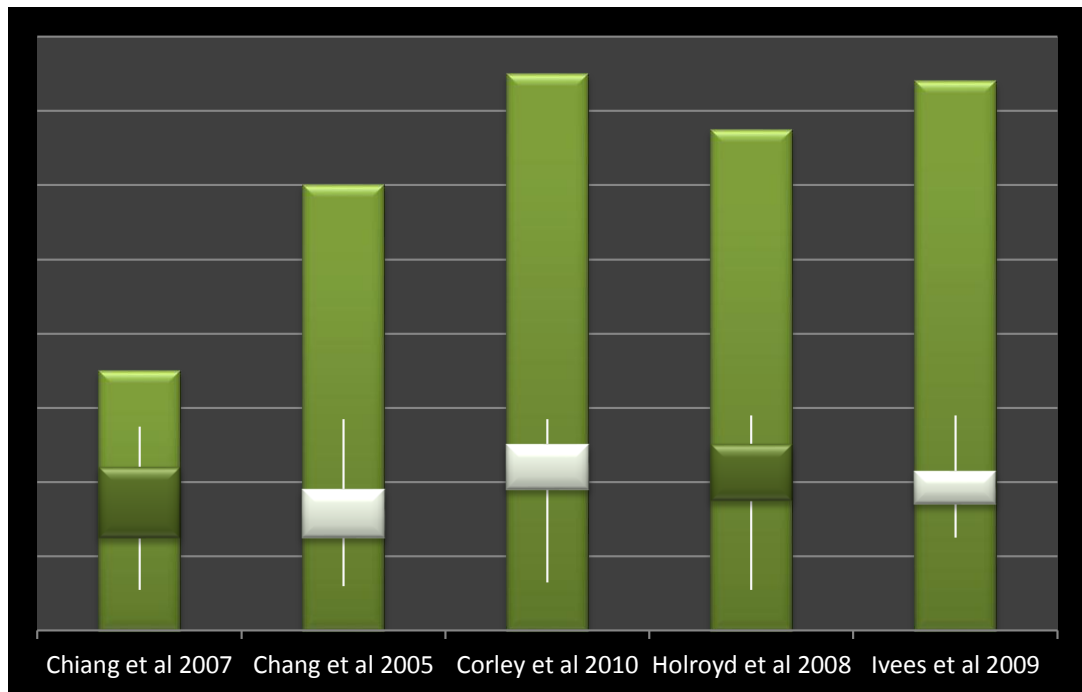


Figure 2: Box and whisker plot showing the analysis of implications of respiratory pandemic among nurses regarding emotional stress

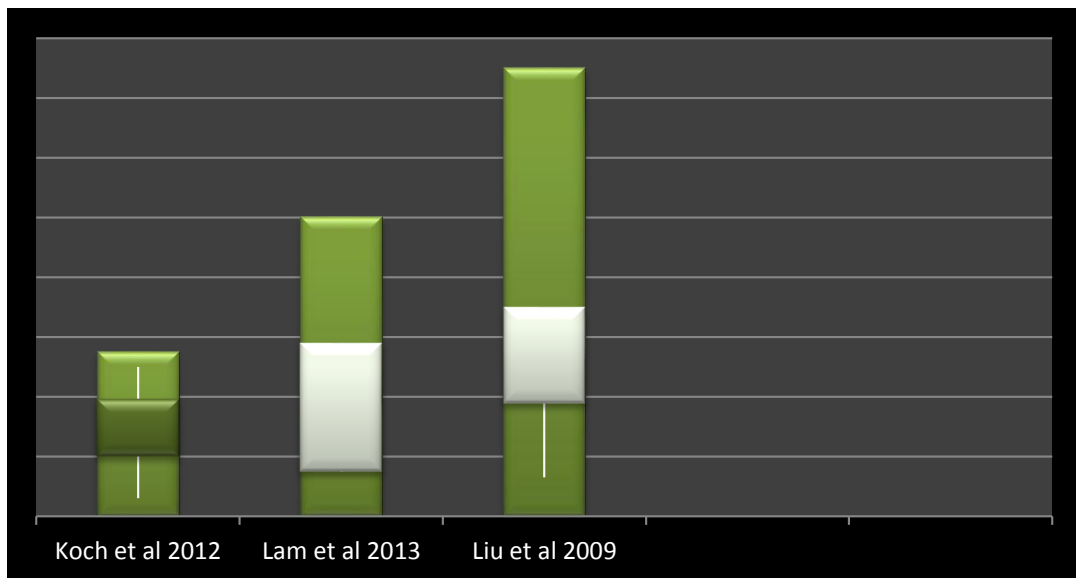


Fig 3: Analysis of implications of respiratory pandemic among nurses regarding professional stress

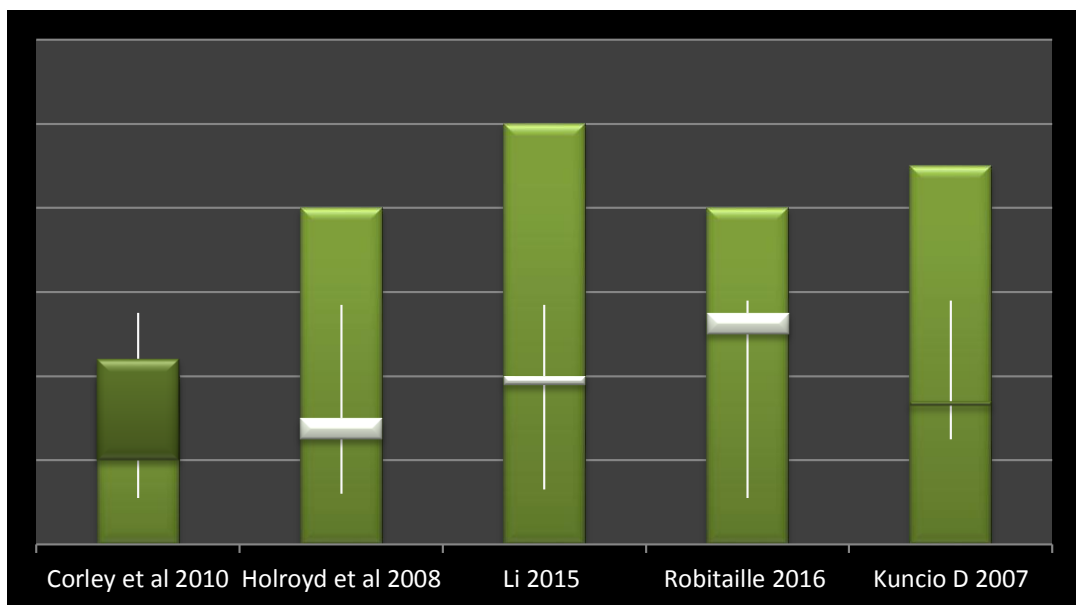


Fig 4: Box and whisker plot showing analysis of implications of respiratory pandemic among nurses regarding psychosocial problems.

Table 3: Summary Cochrane ROB assessment for individual studies

Details of Study	Sequence generation	Allocation concealment	Blinding of participants, personnel	Blinding of outcome assessors	Incomplete outcome data	Selective outcome reporting	Other sources of bias	Overall
Chiang and associates in year. 2007	+	?	?	?	+	+	+	?
Chung and associates in year 2005.	+	+	+	+	+	+	+	+
Corley and associates in year 2010	?	?	?	?	+	+	+	?
Holroyd & McNaught in the year 2008	+	-	+	+	+	+	+	-
Ives and associates in year 2009	+	?	?	?	+	+	+	?
Koh and associates in. 2012)	+	?	?	?	+	+	+	?
Lam & Hung in year 2013	?	?	?	?	+	+	+	?
Liu & Lehr in year 2009	+	-	+	+	+	+	+	-
Shih and associates in year. 2007	+	-	+	+	+	+	+	-
Wong and associates in year. 2012	+	?	?	?	+	+	+	?

+ = It represent low risk of bias

? = It represent unclear risk of bias

- = It represent high risk of bias

Discussion

Epidemics and pandemics affecting illnesses of the respiratory system, such as COVID -19, are more contagious because the infections spread quickly through airborne droplets and person-to-person contact. Nurses make up the majority of the health professionals who work as the key frontline workers in COVID -19 pandemics.^[11,12] Nurses are at the greatest risk of contracting these viruses since they are exposed to them directly. Nurses come into intimate touch with patients

in order to give health care directly to them, making them more exposed to COVID-19 and other viral infections. Seventy persons were reported to have died as a result of the SARS virus outbreak in Taiwan. Four of the seventy people who died were nurses.^[20-24]

This systematic review and meta-analysis yielded several dimensions, each of which contained summarised findings like responsiveness of systematised organisational reaction, acknowledging the physical and emotional consequences, and collaborative nursing teams offering exceptional treatment. These findings bring together what is documented in the research about nurses' experiences during pandemics and epidemics. As a result, they are critical in informing support plans to improve the global nursing workforce both during and after the current COVID-19 epidemic.

Many nurses highlighted respectful relationship among nursing colleagues in this review and meta analysis and in the setting of a medical pandemic while participants highlighted how collaborative the team was and how disasters promoted professional cooperation. According to Hansen (1995), the basic goal of collegiality is to pursue some overarching goal in attempt to avail medically care coordination. Nurses operate in part of an interconnected yet stressful healthcare setting amid moments of emergency, such as natural catastrophes and medical outbreaks that seem to drive collegial connections to the fore, presumably to guarantee that the treatment offered is always of the best quality.

The patient is at the very heart of the nursing practice, and the cause for its very existence. According to this study, nurses have a great sense of responsibility toward their patients. Despite their dread and exposure, nurses' duty to care for patients outweighs their conflicting responsibilities to their relatives and the possibility of being exposed themselves.

Although nurses had a great desire to continue providing care because of their significant sense of responsibility and desire to do the proper thing, these attributes did not prevent them from carrying concerns and fears about their own and their dependents' safety. It was critical to recognise both the physical and mental effects of nursing practise during crises, particularly those that put the nurse in grave risk. Concern of infection and contamination was also a role in this systematic review and meta analysis, as it was in research on H1N1, SARS, and the Ebola virus. Importantly, despite their apprehension, nurses stay in the job and continue to give care.

The response of the organisation was a major factor for nurses in all of the research included in this analysis. Participants expected their organisations to give them with easy-to-understand information regarding the pandemic that was presented consistently. They didn't want any 'misleading messages.' Understanding best practises in PPE use and having adequate PPE appear to be the most pressing concerns, as evidenced by numerous research on pandemics and epidemics.

Pandemics have a number of effects for health-care systems, particularly the human workforce. The percentage of frontline health professionals affected during

COVID 19 is substantially higher than in previous respiratory virus pandemics, according to reports. Nurses have a professional obligation to care for the human population in the event of a pandemic, however there are worries among nurses about their responsibilities. Aside from that, they believe their intensive duty during the pandemic is having a negative impact on their personalities.^[25-27] Nurses have highlighted a number of concerns about their role during the pandemic. These included an increased risk of becoming sick, an increased risk of infection spreading to family members, fear of losing their jobs, and severe restrictions on their personal liberty. These issues are exacerbated by issues such as a lack of an irregular supply of PPE kits during pandemics, as well as a lack of other critical goods and resources needed to maintain a healthy supply chain.^[28-30]

In this pandemic, it has been reported that nurses have experienced psychosocial challenges as a result of their professional tasks in acute care hospital settings. They have experienced increasing stress as a result of their long-term estrangement from their families, sleep loss, tremendous workloads due to a lack of competent staff, and high demands from the healthcare system.^[31-33] The elevated risk among health workers has been evaluated in current publications. However, very few studies have been presented that have offered statistics specifically about risk among nurses, independent of other health advocates, and analysed nurses' experience with the pandemic. As a result, this systematic review and meta analysis has been proposed with the goal of analysing the experiences of nurses working in hospitals providing acute care during a respiratory infection pandemic.

Limitations

Despite the thoroughness with which this systemic review and meta analysis was carried out, there are some limits that must be addressed. To begin with, despite conducting a thorough scan of the databases through using optimum key word combinations, articles not included in these databases may have been overlooked. Furthermore, only publications published in English were included in this study. As a result, papers published in other native languages where the SARS pandemic was prevalent may have been ruled out.

Conclusion

From the results of this systematic review and meta-analysis it is concluded that nurses working in the acute care hospital settings during respiratory pandemics suffers from lot of problems and some of them might even leave their jobs. Therefore it is very necessary that government, health care organizations, policy makers and nursing groups should take proper steps to support the nurses because they are one of the most important frontline health workers.

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