# DEVELOPMENT AND VALIDATION OF SAFETY PRACTICES, PERCEIVED RISK, RISK COPING AND STIGMA QUESTIONNAIRE AMONG FRONTLINE HEALTHCARE WORKERS DEALING WITH COVID-19 PANDEMIC IN HOSPITAL UNIVERSITI SAINS MALAYSIA

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## ABSTRAK

**Pengenalan**: Pekerja kesihatan lebih berisiko tinggi untuk mendapat jangkitan COVID-19 berbanding dengan orang ramai. Amalan keselamatan, tanggapan risiko, cara menangani risiko dan stigma di kalangan pekerja kesihatan wajar disiasat bagi memastikan kesejahteraan mereka. Tujuan kajian ini adalah untuk mengesahkan soal selidik amalan keselamatan, tanggapan risiko, cara menangani risiko dan stigma di kalangan pekerja kesihatan barisan hadapan Hospital Universiti Sains (Hospital USM), Malaysia dalam menangani wabak pandemik COVID-19.

**Methodologi**: Soal selidik ini dihasilkan selepas membuat tinjauan literatur. Kesahan kandungan dilakukan oleh enam pakar, manakala kesahan muka melibatkan lapan pekerja kesihatan dari Jabatan Kecemasan, Hospital USM. Kajian keratan rentas telah dilakukan di kalangan 213 pekerja kesihatan barisan hadapan yang terlibat secara langsung atau tidak langsung dalam pengurusan pesakit COVID-19 di Hospital USM. Data dianalisa dengan kaedah analisis faktor penerokaan (EFA) dan analisis kebolehpercayaan.

**Keputusan**: Kesahan kandungan diterima dengan indeks kesahan kandungan-item (I-CVI) berkisar antara 0.83 hingga 1.00 dan indeks kesahan kandungan-skala (S-CVI) berkisar antara 0.85 hingga 1.00. Keputusan kajian menunjukkan indeks kesahan muka-item (I-FVI) berkisar antara 0.88 hingga 1.00 dan indeks kesahan muka-skala (S-FVI) berkisar antara 0.85 hingga 1.00. Untuk EFA, didapati semua muatan faktor melebihi 0.30. Konstruk amalan keselamatan dibahagikan kepada tiga sub konstruk. Konstruk tanggapan risiko menunjukkan tiga faktor, konstruk cara menangani risiko menunjukkan empat faktor dan konstruk stigma menunjukkan dua faktor. Nilai pekali kebolehpercayaan *Cronbach alpha* wajar (0.714-0.970), kecuali faktor perubahan

pemakanan di bawah konstruk cara menangani risiko yang mendapat nilai 0.479.

**Kesimpulan**: Soal selidik amalan keselamatan, tanggapan risiko, cara menangani risiko dan stigma adalah instrumen yang sah. Instrumen soal selidik ini mempunyai nilai kebolehpercayaan yang tinggi, kecuali faktor perubahan pemakanan di bawah konstruk cara menangani risiko. Soal selidik yang disahkan ini akan menilai pekerja kesihatan secara menyeluruh semasa pandemik COVID-19 dan membimbing penggubal dasar untuk merancang intervensi yang sesuai jika diperlukan.

## ABSTRACT

**DEVELOPMENT AND VALIDATION OF SAFETY PRACTICES, PERCEIVED RISK, RISK COPING AND STIGMA QUESTIONNAIRE AMONG FRONTLINE HEALTHCARE WORKERS DEALING WITH COVID-19 PANDEMIC IN HOSPITAL UNIVERSITI SAINS MALAYSIA**

**Background**: Healthcare workers (HCWs) are at higher risk of contracting COVID-19 infection compared to the general population. Safety practices, perceived risk, risk coping strategies and stigma faced by HCWs are important aspects to be investigated to ensure their wellbeing. This study aims to develop and validate Safety Practices, Perceived Risk, Risk Coping and Stigma Questionnaire among HCWs in Hospital Universiti Sains Malaysia (Hospital USM), Malaysia.

**Methods**: The questionnaire was generated after an extensive literature review. Content validity was done by six experts, followed by face validity with eight HCWs from the Emergency Department, Hospital USM. A cross-sectional study was done among 213 frontline HCWs directly or indirectly involved in managing COVID-19 patients in Hospital USM. Exploratory factor analysis (EFA) and reliability analysis were done.

**Findings**: Content validity was acceptable with item-level content validity index (I-CVI) ranging from 0.83 to 1.00 and scale-level content validity index (S-CVI) ranging from 0.85 to 1.00. Face validity was acceptable with item-level face validity index (I-FVI) ranging from 0.88 to 1.00 and scale-level face validity index (S-FVI) ranging from 0.85 to 1.00. For EFA, all factor loadings were more than 0.30. The safety practices domain was divided into three subdomains. The perceived risk domain showed three factors, the

risk coping domain showed four factors, while the stigma domain revealed two factors. Cronbach's alpha was acceptable (0.714-0.970) except for the factor dietary change under the risk coping domain which scored 0.479.

**Conclusions**: The Safety Practices, Perceived Risk, Risk Coping and Stigma Questionnaire is valid. All domains of this questionnaire have good reliability, except for the factor dietary change under the risk coping domain. This validated questionnaire will thoroughly assess HCWs during the COVID-19 pandemic and guide policymakers to plan appropriate interventions if required.

**Keywords**: COVID-19, healthcare workers, safety practices, perceived risk, stigma

# CHAPTER 1: INTRODUCTION

The coronavirus disease 2019 (COVID-19) is an infectious respiratory disease which was first detected in Wuhan, Hubei Province, China in December 2019. COVID-19 rapidly spread to many countries of the world which led to it being declared as a pandemic on March 11, 2020, by the World Health Organization (WHO) (World Health Organization, 2020). It was in March 2020 as well that the first case of COVID-19 was reported in Malaysia. There are 4.49 million positive COVID-19 cases detected in Malaysia, with 35731 deaths as of 18 June 2022 (COVIDNOW, 2022). As the number of patients infected with COVID-19 increased, the workload of healthcare workers (HCWs) have increased as well. A systematic review and meta-analysis have found that a high proportion of HCWs experienced significant levels of depression, anxiety and insomnia during the COVID-19 pandemic (Pappa et al., 2020).

HCWs have a higher risk of contracting COVID-19 compared to the general population (adjusted HR 11.61, 95% CI 10.93–12.33), and this may be due to interaction with ill patients and/ or potentially infectious co-workers (Nguyen et al., 2020; Sim, 2020). Up to March 2022 in Malaysia, 18354 HCWs were infected with COVID-19, with 1066 close contacts (Free Malaysia Today, 2022). This highlights the importance of proper safety and preventive practices among HCWs to prevent the spread of COVID-19. Several studies have already been done to assess knowledge, attitude and practice among HCWs (Kanu et al., 2021; Saqlain et al., 2020).

Risk perception of HCWs towards COVID-19 plays a vital role as it shapes their health-related behaviours (Janz and Becker, 1984). A high risk perception leads to

preventive behaviours toward COVID-19 (Norman et al., 2005; Yıldırım et al., 2020). However, another study had shown a high level of perceived risk, worry, anxiety and disruption of daily routine during the COVID-19 pandemic (Kwok et al., 2020). Higher perceived risk was associated with mental health problems as shown by previous research during severe acute respiratory syndrome (SARS) and Ebola outbreak (Cheng et al., 2007; Yang and Chu, 2016). Therefore an acceptable level of perceived risk is vital to practice preventive health behaviours while a high level of perceived risk may lead to adverse mental health outcomes among HCWs.

Coping strategies among HCWs during this unprecedented COVID-19 pandemic are important as they may have a protective or harmful effect on their health and wellbeing. Several questionnaires were created by previous research to assess coping strategies for stress, anxiety and depression (Endler and Parker, 1990; McWilliams et al., 2003; Muller and Spitz, 2003). Adaptive and maladaptive coping methods need to be identified among HCWs in order to maintain good mental health.

During this COVID-19 pandemic, HCWs are a group of people who may be labelled, stereotyped, and discriminated against because of a perceived link to the pandemic, particularly when the infection is highly contagious. An analytical cross-sectional global study involving 837 HCWs from 173 countries showed that HCWs are significantly more likely to experience COVID-19 related stigma and bullying (Dye et al., 2020). A study from Egypt showed that 31.2% of physicians reported severe level of COVID-19 related stigma (Mostafa et al., 2020). While another study from India showed that 20% of HCWs experienced COVID-19 stigma (Yadav et al., 2020).

The study aims to create a valid and reliable questionnaire to assess safety practices, perceived risk, coping strategies and stigma among HCWs during the COVID-19 pandemic. The questionnaire's psychometric properties in terms of validity and reliability are evaluated to produce a validated tool that can be used in Malaysia. This validated questionnaire is vital to identify shortcomings and improve strategies to ensure HCWs' physical and mental health.

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# CHAPTER 2: OBJECTIVES

## 2.1 General Objectives

To develop and validate safety practices, perceived risk, risk coping and stigma questionnaire among frontline HCWs in Hospital USM during COVID-19 pandemic.

## 2.2 Specific Objectives

1. To develop and determine the validity (face, content and construct validity) of safety practices, perceived risk, risk coping and stigma questionnaire among frontline HCWs.

2. To determine the reliability (internal consistency) of safety practices, perceived risk, risk coping and stigma questionnaire among frontline HCWs.

# CHAPTER 3: MANUSCRIPT

## 3.1 Title page

**Development and validation of safety practices, perceived risk, risk coping and stigma questionnaire among frontline healthcare workers dealing with COVID-19 pandemic in Hospital Universiti Sains Malaysia**

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## 3.2 Abstract

**Background**: Healthcare workers (HCWs) are at higher risk of contracting COVID-19 infection compared to the general population. Safety practices, perceived risk, risk coping strategies and stigma faced by HCWs are important aspects to be investigated to ensure their wellbeing. This study aims to develop and validate Safety Practices, Perceived Risk, Risk Coping and Stigma Questionnaire among HCWs in Hospital Universiti Sains Malaysia (Hospital USM), Malaysia.

**Methods**: The questionnaire was generated after an extensive literature review. Content validity was done by six experts, followed by face validity with eight HCWs from the Emergency Department, Hospital USM. A cross-sectional study was done among 213 frontline HCWs directly or indirectly involved in managing COVID-19 patients in Hospital USM. Exploratory factor analysis (EFA) and reliability analysis were done.

**Findings**: Content validity was acceptable with item-level content validity index (I-CVI) ranging from 0.83 to 1.00 and scale-level content validity index (S-CVI) ranging from 0.85 to 1.00. Face validity was acceptable with item-level face validity index (I-FVI) ranging from 0.88 to 1.00 and scale-level face validity index (S-FVI) ranging from 0.85 to 1.00. For EFA, all factor loadings were more than 0.30. The safety practices domain was divided into three subdomains. The perceived risk domain showed three factors, the risk coping domain showed four factors, while the stigma domain revealed two factors. Cronbach's alpha was acceptable (0.714-0.970) except for the factor dietary change under the risk coping domain which scored 0.479.

**Conclusions**: The Safety Practices, Perceived Risk, Risk Coping and Stigma Questionnaire is valid. All domains of this questionnaire have good reliability, except for the factor dietary change under the risk coping domain. This validated questionnaire will thoroughly assess HCWs during the COVID-19 pandemic and guide policymakers to plan appropriate interventions if required.

**Keywords**: COVID-19, healthcare workers, safety practices, perceived risk, stigma

## 3.3 Introduction

The coronavirus disease 2019 (COVID-19) is an infectious respiratory disease which was first detected in Wuhan, Hubei Province, China in December 2019. COVID-19 rapidly spread to many countries of the world which led to it being declared as a pandemic on March 11, 2020, by the World Health Organization (WHO) (1). It was in March 2020 as well that the first case of COVID-19 was reported in Malaysia. There are 4.49 million positive COVID-19 cases detected in Malaysia, with 35731 deaths as of 18 June 2022 (2). As the number of patients infected with COVID-19 increased, the workload of healthcare workers (HCWs) have increased as well. A systematic review and meta-analysis have found that a high proportion of HCWs experienced significant levels of depression, anxiety and insomnia during the COVID-19 pandemic (3).

HCWs have a higher risk of contracting COVID-19 compared to the general population (adjusted HR 11.61, 95% CI 10.93–12.33), and this may be due to interaction with ill patients and/ or potentially infectious co-workers (4,5). Up to March 2022 in Malaysia, 18354 HCWs were infected with COVID-19, with 1066 close contacts (6). This highlights the importance of proper safety and preventive practices among HCWs to prevent the spread of COVID-19. Several studies have already been done to assess knowledge, attitude and practice among HCWs (7,8).

Risk perception of HCWs towards COVID-19 plays a vital role as it shapes their health-related behaviours (9). A high risk perception leads to preventive behaviours toward COVID-19 (10,11). However, another study had shown a high level of perceived risk, worry, anxiety and disruption of daily routine during the COVID-19 pandemic (12). Higher perceived risk was associated with mental health problems as shown by previous research during severe acute respiratory syndrome (SARS) and Ebola outbreak (13,14).

Therefore an acceptable level of perceived risk is vital to practice preventive health behaviours while a high level of perceived risk may lead to adverse mental health outcomes among HCWs.

Coping strategies among HCWs during this unprecedented COVID-19 pandemic are important as they may have a protective or harmful effect on their health and wellbeing. Several questionnaires were created by previous research to assess coping strategies for stress, anxiety and depression (15–17). Adaptive and maladaptive coping methods need to be identified among HCWs in order to maintain good mental health.

During this COVID-19 pandemic, HCWs are a group of people who may be labelled, stereotyped, and discriminated against because of a perceived link to the pandemic, particularly when the infection is highly contagious. An analytical cross-sectional global study involving 837 HCWs from 173 countries showed that HCWs are significantly more likely to experience COVID-19 related stigma and bullying (18). A study from Egypt showed that 31.2% of physicians reported severe level of COVID-19 related stigma (19). While another study from India showed that 20% of HCWs experienced COVID-19 stigma (20).

The study aims to create a valid and reliable questionnaire to assess safety practices, perceived risk, coping strategies and stigma among HCWs during the COVID-19 pandemic. The questionnaire's psychometric properties in terms of validity and reliability are evaluated to produce a validated tool that can be used in Malaysia. This validated questionnaire is vital to identify shortcomings and improve strategies to ensure HCWs' physical and mental health.

## 3.4 Methods

### 3.4.1 Study design

A cross-sectional study was conducted among frontline HCWs in Hospital Universiti Sains Malaysia (Hospital USM) from January 2021 to August 2021.

### 3.4.2 Questionnaire item development

An extensive literature review was conducted using the medical search engine on PubMed and Google scholar. Keywords consisting of "COVID-19", "Health care workers", "Safety practices", "Perceived risk", "Stigma", "Risk Coping", "Validation" and "Questionnaire" were used to search for relevant articles. Our questionnaire on safety practice, perceived risk, risk coping and stigma was developed in the Malay language. Initially, the domain of safety practices was divided into safety practices of HCWs (27 items) and organizational safety practices (5 items). Domain perceived risk consisted of 18 items while domain stigma had 10 items.

### 3.4.3 Content validity

Six expert reviewers included two family medicine specialists, one internal medicine specialist, one emergency physician, one public health specialist and one psychiatrist. Online content validation form which included the domains and items of the questionnaire were sent via email to each respective expert. They were then requested to critically review each domain and item before providing a score on each item based on the relevance scale. The relevance scale is a 4-point scale, namely: 1 (the item is not relevant to the measured domain), 2 (the item is somewhat relevant to the measured domain), 3 (the item is quite relevant to the measured domain), 4 (the item is highly relevant to the measured domain). Relevance scales of 0 and 1 were recoded as 0, while

relevance scales of 2 and 3 were recoded as 1. Subsequently, the content validity index (CVI) was calculated and items scoring less than acceptable CVI values (at least 0.83) were removed or modified (21). Item-level content validity index (I-CVI) was calculated by dividing the number of experts in agreement by the number of experts consulted. Scale-level content validity index was calculated based on the average method (S-CVI/Ave) or based on the universal agreement method (S-CVI/UA). S-CVI/Ave was obtained by dividing the sum of I-CVI scores by the number of items, while S-CVI/UA was obtained by getting the number of items which had 100% expert agreement divided by the total number of items (21).

### 3.4.4 Cognitive interviews and face validity

This was done to assess the extent to which the questions reflect the domains of safety practice, perceived risk, risk coping strategies and stigma. Questions which were deemed confusing by the participants were identified and modified to improve clarity. Suggestions on grammar, word choice and answer options were also gathered from participants. For this study, eight participants were recruited from the Emergency Department, Hospital USM. The participants included two medical officers, two nurses, two medical assistants and two medical attendants.

Face validity was quantified by the face validity index (FVI). Clarity and comprehensibility of the items in the questionnaire were assessed. Clarity of the items assesses whether there are multiple ways to interpret the items, while comprehensibility assesses whether the words and sentences in the items are easily understood (22). To assess FVI, participants were asked to rate the items on the degree of clarity and comprehension, namely: 1 (item is not clear and understandable), 2 (item is somewhat clear and understandable), 3 (item is clear and understandable), 4 (item is very clear and

understandable). The clarity and comprehension rating scales were then recoded to 0 (for scales 1 and 2) and 1 (for scales 3 and 4). Items which scored an acceptable FVI value of at least 0.83 were maintained. Similar to CVI, the item-level face validity index (I-FVI) and scale-level face validity index were calculated. I-FVI was calculated by dividing the raters in agreement with the total number of raters. Scale-level face validity index was measured based on the average method (S-FVI/Ave) or based on the universal agreement method (S-FVI/UA). S-FVI/Ave was calculated by dividing the sum of I-FVI scores with the number of items while S-FVI/UA was calculated by dividing the number of items which obtained 100% rater agreement with the total number of items (22).

### 3.4.5 Study population

Inclusion criteria were frontline HCWs which include physicians, nurses, medical assistants, medical attendants, medical lab technicians and science officers working for at least 3 months duration from Anaesthesiology Department, Emergency Department, Internal Medicine Department, Community Medicine Department, Haematology Department, Microbiology and Parasitology Department, Pathology Department, Chemical Pathology Department, Transfusion Medicine Unit and Human Genome Centre in Hospital USM during the study period. The exclusion criteria was respondents who were unable to understand the Malay language. Our estimated sample size was 200 respondents. Convenient sampling was used for this study.

### 3.4.6 Data collection

The self-administered questionnaire in the Malay language was prepared in Google form format. A key person from each department was appointed to distribute the Google form questionnaire to HCWs in their department via WhatsApp groups. The

online questionnaire included a research information sheet for participants to understand the purpose of the study, study procedures and confidentiality of information gathered. Informed consent was obtained from participants before enrolment in the study. The questionnaire could be completed in 10 minutes.

### 3.4.7 Data analysis

Statistical analysis was done using SPSS software version 27. First, the data was analysed using descriptive statistics to describe sociodemographic characteristics. Categorical data was described in terms of frequency and percentage while numerical data was presented as mean (SD) for normally distributed data and median (IQR) for non-normally distributed data.

Exploratory factor analysis (EFA) was done to explore the structure of the items. The frequency and percentage of responses for each item were analysed descriptively. Principal axis factoring (PFA) was used to extract the factors. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy of more than 0.60 was suitable for factor analysis (23). Bartlett's Test of Sphericity should be significant ($p<0.05$) for factor analysis. Eigenvalue >1 was considered significant for factor extraction. A scree plot was also used for factor extraction. This is done by extracting the number of factors above the last substantial decline in the plot (elbow) (23). Factor rotation was done using the Promax rotation procedure. Cut off point for factor loading was 0.30 as this met the minimal level for interpretation of a scale's structure (24). Meanwhile, the communalities cut-off point was set at 0.30 and higher to indicate convergent validity (25).

The internal consistency and reliability of the factors were analysed using Cronbach's alpha. The lower limit for Cronbach's alpha is 0.60 for exploratory studies

(24). A high Cronbach's alpha value indicates a high internal consistency where individual items are intercorrelated and measure the same construct (24).

### 3.4.8 Ethical consideration

Ethical approval was obtained by Human Research Ethics Committee USM prior to the commencement of this study (JEPeM Code: USM/JEPeM/COVID19-32). All participants provided informed consent. Data obtained from this study was kept confidential by the researchers.

## 3.5 Results

### 3.5.1 Content validity

A questionnaire assessing four domains was developed. The domains are safety practices (including 26 items for safety practices of HCWs, 5 items for organizational safety practices), perceived risk (13 items), risk coping strategies (17 items) and stigma (10 items). Items assessing coping strategies which were initially placed under the domain of perceived risk were moved to a new domain named risk coping strategies as suggested by expert reviewers. The calculation of I-CVI scores during the first round of content validation are shown in S1 Table.

Results after the second round of validation showed all items had an I-CVI score ranging from 0.83 to 1.00, with four items scoring 0.83 and 67 items scoring 1.00. Scale-level content validity index based on the average method (S-CVI/Ave) and based on the universal agreement method (S-CVI/UA) were calculated as shown in S2 Table. S-CVI/Ave score was 0.99 for the safety practice of HCWs, 1.00 for both organizational safety practice and risk coping strategies, 0.97 for perceived risk and 0.98 for stigma. S-CVI/UA score was 0.96 for the safety practice of HCWs, 1.00 for both organizational

safety practice and risk coping strategies, 0.85 for perceived risk and 0.90 for stigma.

### 3.5.2 Face validity

Face validity was performed by using the preliminary Safety Practices, Perceived Risk, Risk Coping and Stigma Questionnaire among eight HCWs who worked at Emergency department Hospital USM. In-depth interviews were conducted face-to-face with the participants to gather information on the relevance, clarity and comprehensibility of the questionnaire. The questionnaire was generally well accepted and understood by the participants. Appropriate changes were made to improve the clarity of the items, including changing the question preceding Items 16 to 22 of the safety practices questionnaire from "Do you have adequate stock of personal protective equipment (PPE)?" to "Do you have adequate stock of personal protective equipment (PPE) at the workplace?". Item 7 under risk coping strategies "Engage in more conversations with friends, colleagues or family members" was rephrased to "Engage in more conversations (either face-to-face or virtual) with friends, colleagues or family members" as guidelines by the Ministry of Health (MOH), Malaysia during COVID-19 pandemic recommended physical distancing among HCWs (26).

Five items scored I-FVI of 0.88, while 66 items scored I-FVI of 1.00. S-FVI/Ave score was 0.98 for perceived risk, 0.99 for safety practice of HCWs, risk coping strategies and stigma, while organizational safety practice scored 1.00 (S3 Table). S-FVI/UA score was 0.96 for the safety practice of HCWs, 1.00 for organizational safety practice, 0.85 for perceived risk, 0.94 for risk coping strategies and 0.90 for stigma.

### 3.5.3 Sociodemographic characteristics

A total of 213 HCWs were included in the psychometric analysis of this study. The respondents' mean (SD) age was 32.9 (6.20) years. Most of the respondents were female (64.8%), Malay (93.9%) and married (76.1%) as shown in Table 1. The median (IQR) duration of service of respondents was 6.0 (7.0) years with a range from 6 months to 36 years of service. All respondents have completed tertiary level education.

Table 1: Sociodemographic data of the participants (n=213)

| Variable | n (%) |
|---|---|
| Gender | |
| Male | 75 (35.2) |
| Female | 138 (64.8) |
| Race | |
| Malay | 200 (93.9) |
| Non Malay | 13 (6.1) |
| Job category | |
| Medical officer | 47 (22.1) |
| Medical specialist | 10 (4.7) |
| Nurse | 67 (31.5) |
| Medical assistant | 25 (11.7) |
| Medical attendant | 51 (23.9) |
| Medical lab technician | 9 (4.2) |
| Science officer | 4 (1.9) |
| Department | |
| Anaesthesiology | 14 (6.6) |
| Emergency | 72 (33.8) |
| Internal medicine | 95 (44.6) |
| Community medicine | 7 (3.3) |
| Laboratory-based | 25 (11.7) |
| Level of education | |
| Certificate and Diploma | 138 (64.8) |
| Bachelor's degree | 50 (23.5) |
| Master's and Doctorate degree | 25 (11.7) |
| Marital status | |
| Married | 162 (76.1) |
| Not married | 47 (22.1) |
| Divorced or widow | 4 (1.9) |
| Managed suspected or confirmed COVID-19 patients | 159 (74.6) |
| Received COVID-19 vaccine | 206 (96.7) |

Results showed that 26.8% of respondents were physicians, while supportive staff made up 73.2% of respondents. Nurses made up the highest percentage of respondents with 31.5%. Laboratory-based supportive staff included medical lab technicians (4.2%) and science officers (1.9%). The majority of respondents (85.0%) were from clinical departments, 3.3% were from the Community Medicine Department and 11.7% of respondents were from laboratory-based departments. The majority of participants have previously managed suspected or confirmed COVID-19 patients (74.6%) while most have already received the COVID-19 vaccine (96.7%).

### 3.5.4 EFA and Internal Consistency

#### 3.5.4(a) Safety practices

The preliminary number of items under safety practices questionnaire was 31, with 26 items under safety practices of HCWs and 5 items under organizational safety practices. Twenty-one items were rated using a Likert-type scale and subjected to EFA while ten items were analyzed descriptively as shown in S4 to S6 Tables.

Subdomains preventive measures and advice for patients comprised of 16 items with a five-point Likert scale ranging from 0 = never to 4 = all the time. EFA analysis revealed three factors instead of two factors which did not fit well due to cross-loading for Items A6, A7, A12, A14 and A15. Therefore, these two subdomains were analyzed separately.

Subdomain preventive measures which consist of 12 items had a KMO index of 0.882, Bartlett's test of sphericity was significant (p-value <0.001). There were 2 factors with Eigenvalues above 1 (factor 1= 6.344, factor 2= 1.163), however, the Scree plot suggested one factor. If a two-factor solution was chosen, cross-loading for Items A6, A7,

A12 and A15 were found. Therefore, the one-factor solution was selected which explains 52.87% of the total item variance. Factor loadings ranged from 0.459 to 0.806 (Table 2). Item A5 "Cough etiquette" had low communality of 0.211, however, this item was maintained as it was deemed as an important prevention measure by researchers. Other items under this subdomain had communalities ranging from 0.312 to 0.649 (Table 2), which were acceptable. Subdomain advice for patients consists of 4 items. KMO index showed 0.817 with significant Bartlett's test of sphericity (p-value <0.001). Scree plot and Eigenvalue greater than one rule extracted a single factor for this subdomain which account for 91.92% of total item variance. Factor loading ranged from 0.927 to 0.963, while communalities ranged from 0.859 to 0.927 (Table 2).

Table 2: Exploratory factor analysis of domain safety practices (n=213)

| Factor | Item | Factor loading | Communality |
|---|---|---|---|
| Preventive measures | A4 | 0.787 | 0.619 |
| | A5 | 0.459 | 0.211 |
| | A6 | 0.769 | 0.592 |
| | A7 | 0.743 | 0.552 |
| | A8 | 0.736 | 0.542 |
| | A9 | 0.729 | 0.531 |
| | A10 | 0.697 | 0.486 |
| | A11 | 0.559 | 0.312 |
| | A12 | 0.806 | 0.649 |
| | A13 | 0.719 | 0.518 |
| | A14 | 0.625 | 0.391 |
| | A15 | 0.678 | 0.460 |
| Advice for patients | A23 | 0.936 | 0.876 |
| | A24 | 0.963 | 0.927 |
| | A25 | 0.952 | 0.907 |
| | A26 | 0.927 | 0.859 |
| Attitude toward infection control | B3 | 0.973 | 0.947 |
| | B4 | 0.958 | 0.918 |
| | B5 | 0.940 | 0.883 |

Subdomain attitude toward infection control which consists of three items was analyzed with EFA separately as the five-point Likert scale ranged from "Very

dissatisfied" to "Very satisfied". EFA showed an acceptable KMO index of 0.778 and a significant Bartlett's test of sphericity (p-value <0.001). One factor was extracted based on an Eigenvalue greater than one rule and a Scree plot. This single factor explains 94.38% of the total item variance. Factor loadings for 3 items under this subdomain ranged from 0.940 to 0.973, while communalities ranged from 0.883 to 0.947 (Table 2). Subdomain management after contact with Persons Under Investigation (PUI) consists of two items (Item A2 and A3) rated using four-point Likert scale of agreement. KMO index was low (0.500) for this subdomain, hence descriptive statistics were done as shown in S7 Table.

Subdomain preventive measures, advice for patients and attitude toward infection control were subjected to reliability analysis as shown in S8 Table. Cronbach's alpha was 0.901, 0.970 and 0.970 for each of the subdomain respectively. Under subdomain preventive measures, Item A5 "Cough etiquette" and Item A11 "Open windows or create proper ventilation" scored 0.903 and 0.902 for Cronbach's alpha if the items were deleted. However, researchers have decided to maintain these two items as they are important COVID-19 workplace Standard Operating Procedure (SOP) recommended by MOH, Malaysia (27).

**3.5.4(b) Perceived risk**

Item C1 is a single item to assess the perceived probability of contracting COVID-19 infection among HCWs. The majority of respondents (79.7%) think that they will get COVID-19 infection in the future as shown in S9 Table. Eight items under this domain were subjected to factor analysis to assess other dimensions of perceived risk (Items C2 to C9). KMO index was 0.667, with significant Bartlett's test of sphericity (p-value <0.001), indicating the sample size was satisfactory for factor analysis. Items C4 "You

are confident in protecting yourself and family members from COVID-19 infection" and C9 "You are confident in capability of HCWs to treat COVID-19 infection" scored low communalities of 0.094 and 0.045 respectively. Three factors had Eigenvalues above 1 (2.930, 1.416 and 1.062) which explain 67.60% of total item variance. Item C9 had a low factor loading of 0.214 and was removed. After removing Item C9, EFA was run again and Item C4 had a factor loading of 0.277, which prompted removal. Therefore, six items remained for factor analysis which showed three factor solution. The three factors extracted were named worry, effect on daily life and mental health. Factor worry showed factor loading of 0.838 and 0.891, with communalities 0.759 and 0.775 as shown in Table 3. Factor effect on daily life showed factor loading of 0.768 and 0.842, with communalities 0.572 and 0.752. Factor mental health had factor loading of 0.707 and 0.855, while communalities showed 0.606 and 0.666. Two items were deleted from this domain.

Table 3: Exploratory factor analysis of domain perceived risk (n=213)

| Factor | Item | Factor loading | Communality |
|---|---|---|---|
| Worry | C2 | 0.891 | 0.775 |
| | C3 | 0.838 | 0.759 |
| Effect on daily life | C5 | 0.768 | 0.572 |
| | C6 | 0.842 | 0.752 |
| Mental health | C7 | 0.707 | 0.606 |
| | C8 | 0.855 | 0.666 |

Reliability analysis as depicted in S10 Table showed that Cronbach's alpha score for factors worry, effect on daily life and mental health were 0.856, 0.766 and 0.761 respectively. Items C10 to C13 were not suitable for EFA. Item C11 is a multiple choice question while Items C10, C12 and C13 are dichotomous closed-ended questions with a third option of "Not Sure". Descriptive statistics results for these items are shown in S11 and S12 Tables.

### 3.5.4(c) Risk coping strategies

Fifteen items for risk coping strategies rated using Likert scale of frequency were subjected to EFA. KMO index was 0.827, with significant Bartlett's test of sphericity (p-value <0.001). Four factors had Eigenvalues of more than 1 (4.691, 2.446, 1.188 and 1.046) which explain 62.47% of the total item variance. The four factors were named dietary change, adaptive, maladaptive and distancing. EFA results are shown in Table 4. Communalities for factor dietary change ranged from 0.211 to 0.400. Factor loading for factor dietary change ranged from 0.355 to 0.596. Item D5 "Taking supplements or vitamins" was maintained even though it scored 0.211 for communality as it was deemed important by the research team as part of dietary modification. Factor maladaptive had factor loading from 0.677 to 0.965 and communalities ranging from 0.463 to 0.884. Factor adaptive had communalities ranging from 0.295 to 0.560, with factor loading ranging from 0.395 to 0.747. Item D7 "Engage in more conversations with family members, friends or colleagues" had communality of 0.295, however, it is an important item to assess seeking social support and therefore maintained. Factor distancing had factor loadings ranging from 0.433 to 0.895, and communalities ranging from 0.396 to 0.763.

Table 4: Exploratory factor analysis of domain risk coping strategies (n=213)

| Factor | Item | Factor loading | Communality |
|---|---|---|---|
| Dietary change | D1 | 0.596 | 0.384 |
| | D4 | 0.481 | 0.400 |
| | D5 | 0.355 | 0.211 |
| Maladaptive | D2 | 0.965 | 0.884 |
| | D3 | 0.698 | 0.524 |
| | D6 | 0.677 | 0.463 |
| | D12 | 0.766 | 0.673 |
| Adaptive | D7 | 0.395 | 0.295 |
| | D8 | 0.715 | 0.493 |
| | D9 | 0.747 | 0.560 |
| | D10 | 0.687 | 0.452 |
| | D11 | 0.513 | 0.444 |
| Distancing | D13 | 0.656 | 0.468 |
| | D14 | 0.895 | 0.763 |
| | D15 | 0.433 | 0.396 |

Reliability analysis revealed that Cronbach's alpha score for factors maladaptive, adaptive and distancing were 0.852, 0.772 and 0.756 respectively (S13 Table). Factor dietary change had a low Cronbach's alpha score of 0.479. The trial of deletion of Item D5 did not increase Cronbach's alpha result.

Subdomain mental health support comprised of two items, namely Item D16 "Training to improve mental health is needed during COVID-19 pandemic" and Item D17 "Department should provide psychological support team for staff to seek counselling or treatment during COVID-19 pandemic" rated using Likert scale of agreement. This subdomain was not subjected to EFA as the KMO index was low (0.500). Descriptive statistics results are shown in S14 Table.