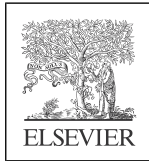




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Knowledge and information credibility evaluation strategies regarding COVID-19: A cross-sectional study

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ABSTRACT

Background: The novel coronavirus disease (COVID-19) pandemic has not only caused significant challenges for health systems worldwide, but also fueled a surge in misinformation. Nurses as frontline health care providers should be equipped with the most accurate information on COVID-19.

Purpose: This study examines nurses' knowledge and strategies of information credibility sourcing.

Method: A cross-sectional survey among nurses and laypersons with no health care background. The questionnaire dealt with knowledge and ability assess credibility of COVID-19 information.

Findings: Nurses' knowledge of COVID-19 preventative behaviors was significantly higher than that of laypersons; however, there was no difference in science-based knowledge of COVID-19. In contrast to laypersons, nurses in this study were better able to discern the credibility of health-related information about COVID-19 than laypersons. Yet they rarely used scientific criteria in evaluating conflicting information.

Discussion: Given the importance of assessing the credibility of information, both information literacy skills and science-based knowledge about COVID-19 should be offered.

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Introduction

As the novel coronavirus disease (COVID-19) spreads across the world, concerns regarding the dissemination of misinformation about the pandemic are growing as well. The widespread misinformation related to

the diagnosis and treatment of COVID-19 has confused both the general population and health care providers, who are battling a relatively under-researched disease (Cuan-Baltazar, Muñoz-Perez, Robledo-Vega, Pérez-Zepeda, & Soto-Vega, 2020; Tasnim, Hossain, & Mazumder, 2020). Nurses in particular, as frontline health care providers, should be equipped with the

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most recent research findings and accurate information, which can be used for direct caregiving and communicated to patients or at-risk populations. Previous research on infectious diseases with pandemic potential showed that misinformation leads to inappropriate control and treatment efforts (Hoffman & Silverberg, 2018; McCloskey & Heymann, 2020; Selvaraj, Lee, Harrell, Ivanov, & Allegranzi, 2018). In this regard, present study offers a unique opportunity to investigate during the ongoing COVID-19 global pandemic period the level of nurses' knowledge, the source of information they rely on, and the strategies they employ for information credibility evaluation.

Review of Literature

Within a few weeks into the year 2020, COVID-19 disease became a trending topic worldwide, creating an avalanche of online searches for information through a phenomenon labeled an 'infodemic' (Cuan-Baltazar et al., 2020). Indeed, this is the first major disease outbreak that poses a global threat in the age of social media (Smith, Ng, & Ho Cheung Li, 2020). Recent studies have revealed a sub-standard quality of health information provided on various websites and within social media such as Twitter and YouTube, including poor-quality information lacking any scientific support (Kouzy et al., 2020; Li, Bailey, Huynh, & Chan, 2020; Shimizu, 2020).

The joint impact of COVID-19 as a novel disease and the lack of information associated with it due to the early state of research resulted in social media becoming a predominant source of information not only for the general public, but for health care providers as well. A recent study found that 61% of health care providers surveyed worldwide, including nurses and physicians, use social media as a primary source of information (Bhagavathula, Aldhaleei, Rahmani, Mahabadi, & Bandari, 2020). As such, when searching online, nurses must be capable of sifting through a wide variety of sources and critically evaluating these sources' credibility and the accuracy, reasonableness, and support of the arguments presented (Barzilai & Zohar, 2012; Tabak, 2015). Since sourcing – using knowledge of the authors' expertise, affiliation, or interests to judge the trustworthiness or qualifications of the information – can facilitate detection of trustworthy content, quality evaluation tools have been developed (e.g., the *Journal of the American Medical Association* [JAMA] benchmarks, Silberg, Lundberg, & Musacchio, 1997; Sobota & Ozakinci, 2015).

Nevertheless, to date, very few studies have focused on the nurses' information-seeking behavior. The few studies undertaken to date have consistently shown that health care practitioners experience considerable difficulties in understanding and applying website evaluation criteria (Ahmad, Musallam, & Allah, 2018; Younger, 2010). Verhoeven, Stehouder, Hendrix, and

Van Gemert-Pijnen (2010) evaluated internet search behaviors among cohort of 20 nurses and concluded that nurses perceive information as complete and relevant only if it supports their existing practices, rather than considering the level of source expertise. According to Barnoy, Volfin-Pruss, Ehrenfeld, and Kushnir (2011), nurses with high self-perceived knowledge within a given domain tend to retrieve health information from more credible websites, while nurses with low knowledge more frequently rely on less credible websites.

Sourcing can be especially challenging when information-seeking yields multiple and often conflicting accounts, with open disagreement among experts. Evaluation of competing accounts requires reconciliation of discrepancies and integration of agreements to construct an integrative answer from multiple websites (Barzilai, Zohar, & Mor-Hagani, 2018; Thomm, Barzilai, & Bromme, 2017). Laypersons with no health care background differ from health care experts in that the former have limited conceptual knowledge on complex health issues, which reduces the ability to directly evaluate the quality of claims based on their previous experience as experts (Bromme, Thomm, & Wolf, 2015). Studies demonstrate that individuals tend to 'hop' from one website to another, assuming that the answer is 'out there' instead of piecing together knowledge across the contradictory and inconsistent information (Bråten & Strømsø, 2011). Notably, regarding the novel COVID-19 disease as a knowledge domain, we are all laypersons who lacking profound expertise with this new infection (Bromme et al., 2015). This reality challenges health care experts' source information credibility and pathways of knowing.

Purpose

The present study aim is twofold: First, to explore nurses' level of knowledge regarding the COVID-19 pandemic; second, to map nurses' information sources as well as epistemic criteria and strategies for information credibility evaluation. In order to understand better how nurses are coping with misinformation and unverifiable content about COVID-19, we compare their epistemic strategies with laypersons' proficiency to meaningfully and critically source the information.

Methods

Research Design and Sample

A web-based, cross-sectional study was conducted in Israel using a survey instrument during mid-May 2020, at the end stage of quarantine and the very beginning of lockdown easing and reopening of local businesses.

The sample included a total of 427 Israeli participants. Of these, 163 were registered nurses and 264 were laypersons with no health care background.

As of mid-May 2020, the number of confirmed COVID-19 cases in Israel was 16,689 with 266 deaths (29 deaths per million citizens). During the end of April and beginning of May, relative to 210 countries and territories worldwide, Israel ranked 47th in number of deaths per million citizens and 25th in number of confirmed cases per million citizens (Worldometer, 2020).

Participants were recruited and responses collected through iPanel (<https://www.ipanel.co.il/en/>), an online polling service that enabled rapid acquisition of responses with representative sampling of gender, age, health care profession and socioeconomic status. This panel is the largest panel survey in Israel, which adheres to the high-quality research code of the European Society for Opinion and Marketing Research (ESOMAR; Bodas & Peleg, 2020; Bodas, Siman-Tov, Kreitler, & Peleg, 2017).

Measurements

Knowledge. To assess participants' knowledge about the COVID-19 virus, we developed a knowledge questionnaire based on WHO guidelines and myth busters (WHO, 2020). The first part incorporates three items that evaluate participants' science-based knowledge about COVID-19 transmission modes, causes, and understanding of possible treatments. For example, one of the multiple-choice questions was the following: "You read that scientists made a breakthrough on coronavirus antibody injections. What does this breakthrough mean?" Response options were: a specific treatment of COVID-19, active immunity, a vaccine to induce the body to produce its own antibodies, or a vaccine to produce herd immunity. Cronbach's alpha yielded a good internal consistency score of 0.74.

The second part assessed procedural knowledge, which we conceptualize as the knowledge of 'how-to'; namely, behaviors to prevent COVID-19 transmission (Dubovi, Levy, & Dagan, 2017). For example, one of the multiple-choice questions was as follows: "Which of the following can protect you from getting infected by COVID-19?" Response options were: disinfecting skin with bleach, drinking alcohol, drinking hot lemon juice, exposure to direct sunlight, washing hands with running water and soap, taking prescribed antibiotics, taking non-steroidal anti-inflammatory drugs (NSAIDs) such as Ibuprofen, smoking cigarettes, or maintaining a physical distance from another person of about six feet. Cronbach's alpha yielded a good internal consistency score of 0.72.

Source of information. To assess participants' source of information on COVID-19, they were asked to mark which sources they use from a variety of potential information sources: social media, professional websites, news media (television/newspapers), scientific articles, work-based educative initiatives, important people in the community (i.e., family, friends, and

religious leaders), and physicians or nurses. These categories were chosen based on framework proposed by Sinatra and Lombardi (2020) and Tabak (2020) as well as COVID-19 sources of information that were reported by Bhagavathula et al (2020). In addition, they were permitted to add other sources of information.

Credibility sourcing. During the survey session, an established approach of introducing scenarios of conflicting accounts to assess participants' strategies for evaluating credibility of information, was used (Barzilai & Zohar, 2012; Seo, Blomberg, Altschwager, & Vu, 2020; Thomm et al., 2017). Each participant was asked to evaluate two conflicting articles about the COVID-19 pandemic origin in terms of its credibility and trustworthiness. The articles were presented in a form of scientific news reports. The texts were adopted from real published articles, one published by an Israeli news website and including pieces of misinformation, and the other published by an Israeli medical-professional website. Each article included information about the author's profession and affiliation, as well as where and when the article was published. In measuring sourcing strategies, participants were asked to rate the trustworthiness of the information presented in each article on five-point scale and then to justify their evaluation.

Demographic characteristics. The following information was included: gender, age, marital status, education (years), place of work (hospital, community and nursing homes), health status and working status before and during the outbreak of COVID-19, and income before and during the outbreak of COVID-19.

Ethical Consideration

The study was conducted following the approval of the university ethics committee (#0001444-1). Participation in this survey was voluntary. Informed consent was elicited on the first page of the survey. Confidentiality of personal information was maintained throughout the study by making participants' information anonymous and asking participants to provide honest answers.

Analysis

Descriptive statistics (frequency, distribution, means, and standard deviations) were used to describe participants' demographic and information-sourcing characteristics. Independent sample t tests and chi-square tests were carried out with an effect size as Cohen d and Phi, respectively (Fritz, Morris, & Richler, 2012), to detect differences between nurses and laypersons in information credibility sourcing strategies. In addition, a one-way ANOVA was conducted to examine differences among nurses across different wards and a t test to examine differences between nurses in hospital and out-of-hospital work settings. A Mann-Whitney U test for non-parametric data was used to detect differences

between nurses who worked in COVID-19 teams and nurses working in other wards.

Participants were asked to justify their trustworthiness rating of the two conflicting articles. Those justifications were carefully analyzed by the third author, who then developed a set of descriptive codes for various conflict explanations (Creswell, 2005; Thomm et al., 2017). After the coding scheme of main types of recurring justifications was established, approximately 40% of the justifications were coded jointly by third author and a research assistant, while the remaining 60% was coded by each of these coders independently (the Cohen's Kappa coefficient was computed to be 0.88). Disagreements were fully resolved by discussion between the coders. These are high rates of agreement (McHugh, 2012). Analysis of the data was conducted using SPSS version 25.0.

Findings

Table 1 shows a summary of demographic characteristics of the study participants. There were significant differences between the nurses' and laypersons' groups: the nurses group included more women than men and had a higher level of education, higher income, and more stable employment during COVID-19 than the group with no health care background. All nurses who participated at the study were registered nurses, while 69% reported having a bachelor's degree

at minimum. Israel has two nursing training programs: Registered Nurses with bachelor degree (4-year program) and non-academic registered nurse (2.5–3-year program). As a result of national decision BSN (Bachelor of Sciences in Nursing) became the entry level requirement for admission into the profession in Israel (Toren et al., 2012). As such, nursing cohort characteristics fit the general Israeli nursing workforce (Ashkenazi, Livshiz-Riven, Romem, & Grinstein-Cohen, 2017; Nirel, Riba, Reicher, & Toren, 2012).

All nurses reported working in a hospital setting (58%), community clinics (27%), or nursing homes (8%). Only four nurses (1%) reported working on COVID-19 teams. Nurses who were employed by a hospital reported working at intensive care units, emergency departments, and operating rooms (22%); 32% reported working in internal medicine, neurology, cardiology, and surgical wards; and 32% reported working in pediatrics, neonatal care, postpartum psychiatry, and other wards (Appendix). Seniority in the nursing field was on average 16.4 (± 12.6) years.

Table 2 shows the level of COVID-19 knowledge among nurses and laypersons, and information sources they used. While nurses' procedural knowledge about preventive behaviors related to COVID-19 was significantly higher than laypersons' knowledge with a medium-large effect size, there was no significant difference in science-based knowledge of COVID-19. Neither was there any significant interaction between level of education and level of knowledge in both groups ($r = 0.05$, $p = .30$).

Table 1 – Comparison of Nurses' and Laypersons' Sociodemographic Characteristics (N = 427)

Variables	Nurses (n = 163) M (SD)	Laypersons (n = 264) M (SD)	p	t
Age (years)	40.9 \pm 11.6	40.3 \pm 14.8	.62	0.48
Education (years)	16.6 \pm 2.8	14.5 \pm 3.0	.001	6.97
Gender	N (%)	N (%)	p	χ^2
Female	148 (91%)	133 (50%)	.000	75.09
Male	15 (9%)	131 (50%)		
Married/living with a partner			.002	9.62
Yes	132 (81%)	176 (67%)		
No	31 (19%)	84 (32%)		
Health status			.69	0.51
No health issues	123 (76%)	196 (74%)		
Health problems	39 (24%)	68 (26%)		
Family income			.001	16.14
Above average	51 (31%)	43 (16%)		
Average	57 (35%)	92 (35%)		
Less than average	54 (33%)	129 (49%)		
Income change due COVID-19 quarantine			.000	13.37
Remained unchanged	82 (50%)	104 (40%)		
Reduced	65 (40%)	100 (38%)		
Significantly reduced	15 (9%)	60 (23%)		
Employment during COVID-19 quarantine			.001	35.888
Continued to work	149 (92%)	176 (67%)		
Unpaid leave	9 (6%)	70 (26%)		
Laid-off	4 (2%)	18 (7%)		

A chi-square test was used for categorical variables and a t test for continuous variables (such as 'age').

Table 2 – Level of COVID-19 Knowledge and Source of Information

	Nurses (n = 163) M (SD)	Laypersons (n = 264) M (SD)	p	t	Effect Size Cohen's d
Knowledge total	44.41 (20.1)	39.55 (19.78)	.01	2.45	.241
Knowledge dimensions					
Science-based knowledge	33.38 (24.8)	33.02 (24.8)	.92	0.09	.011
Procedural knowledge	66.46 (33.2)	52.64 (33.6)	.000	4.15	.416
	N (%)	N (%)	p	χ^2	Phi
Source of COVID-19 information					
Social media	46 (28%)	114 (43%)	.002	9.6	.150
Online websites	89 (55%)	179 (68%)	.006	7.5	.133
News media (television/newspapers)	109 (67%)	213 (81%)	.001	10.5	.160
Work	113 (70%)	40 (15%)	<.001	128.6	.549
Professional resources	71 (44%)	37 (14%)	<.001	46.5	.330
Scientific studies	48 (29%)	33 (12%)	<.001	18.8	.210
Physician/nurse	31 (19%)	31 (12%)	0.038	4.3	.100
Important others (family members, friends, religious leaders)	24 (15%)	112 (42%)	<.001	35.6	.289

Since only small cohort of nurses ($n = 4$) stated as working in COVID-19 teams, there was insufficient statistical power to evaluate the impact of working in COVID-19 teams on knowledge. We found no significant difference in knowledge level between nurses working in various different hospital wards across different levels of emergency, e.g., intensive care vs. the postpartum ward (Appendix; $F_{(3,153)} = 0.88$, $p = .45$). In addition, the impact of nurses' seniority in the profession and the education level did not show a significant impact on nurses COVID-19 knowledge level ($r = -0.10$, $p = .20$; $r = 0.06$, $p = .45$, respectively).

When participants were asked about their source for reliable information about COVID-19, the primary source mentioned by nurses was work (70%), while for laypersons the main source reported was news media (television/newspapers; 81%; Table 2). Laypersons relied significantly more on social media than nurses did (43% vs. 28%, respectively, $p = .002$), as well as on online websites (68% vs. 55%, respectively, $p = .006$) and important people in the community (family, friends, and religious leaders: 42% vs. 15%, respectively, $p < .001$) to obtain information about COVID-19. In contrast, nurses relied significantly more than laypersons (with a large effect size) on information provided at work (70% vs. 15%, respectively, $p < .001$), professional resources (44% vs. 14%, respectively, $p = .000$), and scientific studies (29% vs. 12%, respectively, $p < .001$) to obtain information about COVID-19.

During the survey session, each participant was asked to evaluate the credibility of two articles giving conflicting information (the first providing misinformation). Interestingly, the difference in credibility ratings that laypersons attributed to the two articles was not significant (3.23 ± 1.1 vs. 3.35 ± 1.1 , respectively; $t = -1.23$, $p = .22$). Nurses, in contrast, evaluated the second article as significantly more credible than the first article that had contained pieces of misinformation (2.94 ± 1.2 vs. 3.84 ± 1.5 , respectively; $t = -9.1$, $p <$

$.001$). Nurses' credibility rating of the misinformative first article with was significantly lower than that of the second article, in comparison to the parallel rating among laypersons (2.94 ± 1.2 vs. 3.23 ± 1.1 , respectively; $t = -2.5$, $p < .05$). Nurses' credibility rating of the second article was significantly higher than that of laypersons (3.84 ± 1.5 vs. 3.35 ± 1.1 , respectively; $t = 3.7$, $p < .001$; Figure 1). As with knowledge level also in credibility evaluation, ANOVA revealed no significant difference between nurses across different work settings ($F_{(3,147)} = 0.45$, $p = .71$) and across varied hospital wards.

Table 3 describes the main justifications and evaluation criteria that participants used to assess information credibility of the two contradictory articles. Author expertise (e.g., "because they are physicians, they probably know better") and the assessors' own previous personal experience and knowledge (e.g., "because I read about it elsewhere") were the most common criteria among laypersons.

Likewise, nurses incorporated their own previous experiences and previous knowledge in information evolution. Their tendency to rely on previous knowledge to source the information was supported also by a positive small correlation between the level of science-based knowledge and rating the second article as more credible ($r = 0.20$, $p < .001$). Namely, the higher the respondents' level of science knowledge was, the more credible, relatively to the first article, they assessed the second article to be.

Compared to laypersons, nurses exhibited a stronger tendency to apply the criteria of publisher expertise/qualification (e.g., "Lancet is a respected journal and is presumed to be careful about what it prints") and publisher reputation to judge information trustworthiness. Nurses and laypersons did not differ significantly in their reliance on scientific and empirical evidence for evaluation (e.g., "This article is missing evidence and data analysis, the authors must support their statement") ($p = .08$).

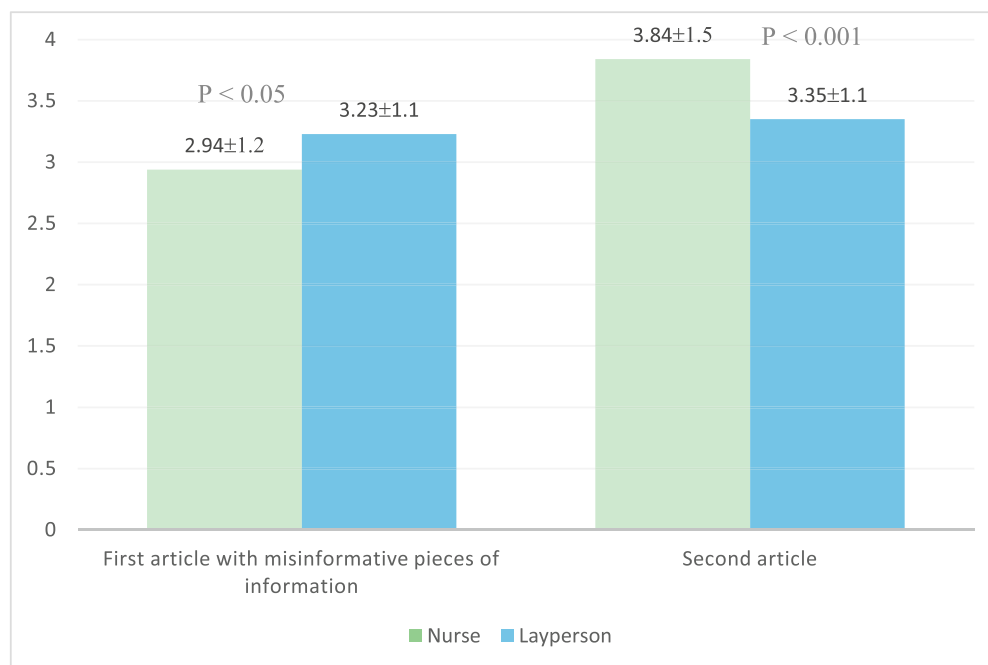


Figure 1 – Nurses’ and laypersons’ evaluation of the two contradictory articles

Discussion

The ability to meaningfully and critically source and integrate multiple pieces of information is vital for 21st century literacy. Given the vast diversity of information available online, including unverified and even malicious information, assessment of source credibility is particularly crucial. While the body of evidence-based knowledge about the novel COVID-19 infection is emerging, this study examines nurses’ knowledge and epistemic strategies applied in ‘real-time’ to distinguish between high- and low-quality information. Nurses as the largest frontline workforce group in hospitals and among other health care providers should be able to carefully evaluate information related to

COVID-19, to be able to make safe clinical decisions. Our findings point at the importance of science-based knowledge about COVID-19 and the necessary skills to appraise the information critically.

Notably, the findings suggest a significant gap in depth of nurses’ knowledge about COVID-19. Particularly, nurses’ procedural knowledge about COVID-19 preventative behaviors was significantly higher than that of laypersons, but still relatively low (an average of 66% correct responses). Moreover, nurses’ science-based knowledge about COVID-19 was predominately inaccurate, suggesting no difference in knowledge level between nurses and laypersons in this regard. These findings are supported by a recent study that identified serious knowledge gaps related to COVID-19 among health care workers, including nurses

Table 3 – Strategies of COVID-19 Information Credibility Sourcing

		Nurses N (%)	Layperson N (%)	p	χ^2	Effect Size Phi
Author	Level of expertise/ qualification	58 (35%)	72 (27%)	.07	3.3	.088
	Authority	13 (8%)	25 (9%)	.60	0.3	.025
	Reputation	13 (8%)	56 (21%)	<.001	13	.175
	Conflict of interest	19 (12%)	41 (15%)	.26	1.25	.054
Publisher	Level of expertise/ qualification	35 (21%)	16 (6%)	<.001	22.7	.231
	Reputation	30 (18%)	19 (7%)	<.001	12.4	.171
Other assessment grounds	Scientific and empirical evidence	44 (27%)	52 (20%)	.08	3.1	.085
	Diverse opinions are presented	9 (5%)	22 (8%)	.27	1.2	.053
	Details (i.e., references, expert credentials and affiliation)	12 (7%)	13 (5%)	.29	1.1	.050
	Previous personal knowledge or experience	55 (34%)	104 (39%)	.24	1.4	.057
	Writing style	3 (2%)	8 (3%)	.45	0.56	.036
	When was the information published	0	4 (1%)	.11	2.5	.076

(Bhagavathula et al., 2020). Bhagavathula et al (2020) reveal a knowledge gap that is apparent especially regarding science-based understandings of COVID-19, such as its viral origin and the meaning of antibiotic vs. antiviral treatment. While the knowledge gap is not surprising and might be explained by the novelty of the COVID-19 virus and insufficient evidence-based understanding about the mechanisms of the disease and its treatment at this time, it does underline the importance of ongoing training (Tasnim et al., 2020).

Accurate knowledge about the causes, consequences, and prevention methods for an infectious disease has been found to be a necessary condition for engaging in appropriate protective behaviors during an infectious disease outbreak (Piltch-Loeb et al., 2019; Taylor, Raphael, Agho, & Jorm, 2009). Research in cognitive psychology indicates that procedural knowledge in itself does not suffice; science-based knowledge is needed for the construction of causal explanations (Hastie, 2015; Rehder & Hastie, 2001). Those causal links between why and how something works enables people to make predictions, understand implications, draw inferences, and offer explanations – all of which are necessary for problem solving, clinical reasoning and self-management in chronic illness (Dubovi, Dagan, Sader Mazbar, Nassar, & Levy, 2018; Dubovi, Levy, Levy, Zuckerman Levin, & Dagan, 2020; Garcia-Retamero, Wallin, & Dieckmann, 2007; Zhang, Swartzman, Petrella, Gill, & Minda, 2017). As such, training sessions for nurses offering a science-based emphasis on the novel COVID-19 disease mechanisms might impact both procedural knowledge and clinical control efforts. Developing such professional sessions targeted both procedural knowledge and science-based knowledge of COVID-19 is vital.

When evaluating the source for nurses' knowledge about COVID-19 disease, we discovered that nurses rely mainly on informational updates provided at work, as well as on news media (television and newspapers). Importantly, nurses were half as likely as laypersons to report using social media as a source of information, and twice more likely to use professional resources and scientific studies. Indeed, we can be confident that official information provided by health care work settings and other professional resources should be reliable. However, a finding of considerable concern is that the majority of nurses (55%) reported using websites as a source of information. In this regard, nurses should carefully evaluate information related to COVID-19, to be able to differentiate unverified malicious information from scientific reliable content.

As such, the burning question of the present study concerned the strategies of information credibility sourcing that nurses tend to use. It became apparent that when nurses encounter conflicting information, they tend to rely on their own previous experiences and knowledge. Bromme et al (2015), in their study comparing medical students' and laypersons' views on conflicts within medicine, suggested a conceptual distinction between first-hand evaluation and second-

hand evaluation. While first-hand evaluations incorporate the ability to assess the information directly using pieces of knowledge or personal experience, second-hand evaluation is based on source reliability. Our findings suggest no difference between nurses and laypersons in using first-hand evaluations. This can be explained by our other finding, which demonstrated no difference in science-based knowledge of COVID-19 between nurses and laypersons. Thus, we can assume that in relation to COVID-19, neither nurses nor laypersons have enough solid previous knowledge to validate the quality of information directly. In tandem with our finding that science-based knowledge is related to credibility evaluation, this understanding makes science-based knowledge of COVID-19 issues especially important for nurses' preparedness.

In contrast to first-hand evaluations, Bromme et al (2015) showed that second-hand evaluations were the most common practices among both medical experts and laypersons to resolve conflicts of information. As such, our results show that in contrast to laypersons, nurses were better able to discern credibility of the information. However, evaluation of competing expert sources requires going beyond surface cues of expertise and authority and necessitates appraisal of additional indicators of expertise, such as publisher expertise and quality of scientific and empirical evidence (Tabak, 2015, 2018). On the one hand, we found that nurses used publisher expertise and reputation more often than laypersons to evaluate the information. However, on the other hand, all study participants hardly ever used epistemic practices, such as evaluation of existence of scientific and empirical evidence. Thus, we propose that nurses should be trained, when faced with a novel disease, to seek to incorporate empirical and scientific data where it is available.

This a cross-sectional study that suggests the need for longitudinal studies across different geographic regions to assess how knowledge and sourcing skills might be developed and varied across cultures and regions, as more evidence-based information regarding COVID-19 is published. In addition, further studies should evaluate nurses' time devoted to nursing practice as possible factor that might have impact on knowledge levels. Despite this limitation, our findings provide valuable information about the knowledge and epistemic strategies of nurses during a pandemic period.

Conclusion

This study aimed to examine nurses' preparedness in terms of knowledge-gathering regarding the current global pandemic by assessing their actual knowledge and strategies of information credibility sourcing. To sum up, a gap in knowledge about COVID-19 was identified, specifically regarding the science-based aspects of the disease, suggesting that further educational

interventions are needed. Nurses were better able to identify cues of credible or not-so-credible information when compared to layperson; however, findings suggest that nurses should be equipped with more scientific strategies for information sourcing.

Given the urgent need to improve nurses' strategies of COVID-19 information sourcing, we can look to several training programs in this regard. Tabak (2015), in her review of scientific literacy, discussed various instructional models to foster productive sourcing. For instance, the SEEK instructional model (Graesser et al., 2007), has been proven highly effective in distinguishing misinformation even with very short (e.g., 1 hour) interventions. Several training programs were also developed for nurses, such as the 'Usage of Online Information Resources by Nurses Project' (Wozar & Worona, 2003). With the urgency of prompting nurses with sourcing information skills becoming more acute now than ever, nurses should adopt such intervention programs to stimulate better strategies in their pathways of knowing.

Acknowledgment

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Appendix

Participating nurses' employment characteristics (n=163)	
Variables	Nurses
Working setting (n=163):	
Hospital	94 (58%)
Community clinics	44 (27%)
Nursing homes	13 (8%)
Missing data	12 (7%)
Hospital Wards (n=94):	
COVID-19 ward	4 (4%)
Intensive care unit	8 (8%)
Emergency ward	8 (8%)
Operating room and recovery room	10 (10%)
Internal medicine	19 (19%)
Cardiology	4 (4%)
General neurology	2 (2%)
Surgical	7 (7%)
Neonatal	6 (6%)
Geriatric	3 (3%)
Postpartum and Gynecology	9 (9%)
Pediatrics	4 (4%)
Psychiatry	6 (6%)
Other (Dermatology, Ear Nose and Throat, Dialysis, Hematology, Rehabilitation)	4 (4%)
Seniority in nursing (years)	16.4 (± 12.6)
Numbers represent n (%) or Mean ± SD.	

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