Stress assessment among internal medicine residents in a level-3 hospital versus a level-2 hospital with only emergency room service for COVID-19

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ABSTRACT

Background: Treating COVID-19 patients can affect anxiety.

Objective: To compare the anxiety of internal medicine residents treating COVID-19 patients at a level-3 hospital with a level-2 hospital.

Methods: A questionnaire related to COVID-19 and anxiety using the State-Trait Anxiety Inventory (STAI-S) was sent to internal medicine residents of a COVID-19 referral level-3 hospital and a level-2 hospital from which all diagnosed COVID-19 cases are transferred to the COVID-19 referral hospital.

Results: Responses were received from 76.3% of the internal medicine residents. There was no difference in the anxiety scores between residents from the level-3 center (44.4) and the level-2 center (44.4), p = 0.9. There was a significant difference between the number of residents from the level-3 center, 22/56 (63%) and the number of residents from the level-2 center, 1/10 (10%) who were concerned about better protective gear (p = 0.003) and between residents from the level-3 center 19/35 (54%) and those from the level-2 center, 1/10 (10%) who were concerned about infecting their families (p = 0.01).

Conclusions: The internal medicine resident anxiety scores were not a function of hospital level, but safety was less of a concern in the level-2 center with only emergency room COVID-19 services.

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1. Introduction

A novel coronavirus was first identified in December 2019 in Wuhan, the capital of China’s Hubei province. The World Health Organization (WHO) named the virus SARS-CoV-2 and called the disease caused by it using the acronym COVID-19, short for coronavirus disease of 2019. The WHO declared COVID-19 to be a public health emergency on 20 January 2020 and on March 11 classified the problem as a pandemic. As of April 20, more than a million cases were reported in Europe.

The case of Dr Li Wenliang highlights that health care workers could be affected by COVID-19. He was the first physician to issue a warning to the public about the new coronavirus in December 2019. He contracted COVID-19 while treating a glaucoma patient at Wuhan Central Hospital on 8 January 2020. One month later, on February 7, he died of the disease. The WHO ‘Coronavirus Disease 2019 (COVID-19) Situation Report-82’ of April 11, featured infection in health care workers as a subject in focus. At the time of the report there was no systematic reporting to the WHO of COVID-19 cases from counties and only a few countries reported specific data about infection in health care workers. On April 10 Italy reported to the WHO that 11% of its infections were among health care workers. Reports in the media spoke about widespread shortages of protective gear for health care workers. Xiang et al. [1], have documented the problem among Chinese health workers. On April 20, the UK National Health Service reported that 27 members of its staff had died of COVID-19.

In view of the challenges of treating patients possibly having COVID-19, as well as those documented with the disease, exposed health care workers can be psychologically stressed [2,3]. A detailed study from China reported severe mental distress in 12.6% of health care workers in the epicenter of the pandemic, the city of Wuhan, versus 7.2% in less affected regions of China [4]. The mental distress among Western health care workers on the front lines of COVID-19 has also been reported [3].

Israel was exposed to the COVID-19 pandemic later than Western Europe. To date the disease incidence and death rates are much lower than Italy, Spain, the UK and the USA. Within the Israeli population, members of the ultra-Orthodox Jewish community have a 10-fold higher incidence of COVID-19.
than the general population. The transmission to this community was originally from other ultra-Orthodox Jewish communities in the USA and Europe. The largest centers of the ultra-Orthodox communities in Israel are B’nei Brak near Tel Aviv and in Jerusalem.

The Hadassah Medical Center has two campuses in Jerusalem. The major campus, at Ein Kerem, has a level-3 hospital (L-3 H). A second smaller campus at Mount Scopus, has a level-2 hospital (L-2 H). During the pandemic, the L-3 H serves as a COVID-19 treatment center. The L2-H has a COVID-19 emergency room, but all COVID-19 patients are sent to the L3-H for hospitalization. This set-up enabled a unique model of a ‘COVID-19 free hospital’. The internal medicine department of each hospital is independent and there is no rotation between staffs.

The authors report a comparative study of the anxiety levels and opinions among internal medicine residents at the L-3 H and the L-2 H, using a validated anxiety questionnaire [5], coupled with a survey of residents’ opinions about specific issues relating to COVID-19. The study was done at the peak of the COVID-19 epidemic in Israel between April 9–23, 2020.

2. Materials and methods

The Hadassah Medical Center has two campuses. One has an 800 bed L-3 H, located in the western part Jerusalem which includes the Hebrew University Medical School. During the COVID-19 pandemic the hospital has a COVID-19 emergency room, an intensive care unit, and separate wards for light, moderate and severe COVID-19 patients. The second campus has a 300 bed L-2 H and is located on a campus in eastern Jerusalem. It does not have departments of oncology, hematology, neurology, interventional radiology, cardiothoracic surgery, ENT, ophthalmology, urology or plastic surgery. During the COVID-19 pandemic the hospital has a COVID-19 emergency room but it does not hospitalize or treat COVID-19 patients. They are referred to the L-3 H for admission.

The study received institutional review board approval. A questionnaire was sent by WhatsApp (WhatsApp Inc. Menlo Park, CA) to each of the residents in the internal medicine departments of the L-2 H (n = 15) and the L-3 H (n = 45) during the height of the epidemic in Israel on 9 April 2020. There is no interchange of internal medicine residents between the two hospitals. Both the L-2 H internal medicine residents and the L-3 H internal medicine residents are on emergency room call 5–7 times a month. The residents of both hospitals work in their hospital’s emergency room with suspected COVID-19 patients. All of the L-3 H internal medicine residents work in the COVID-19 wards. In the L-2 H there are no known COVID-19 patients in the wards. At the time of the questionnaire, the entire country was under lockdown. Except for medical, security and a few strategic workers all citizens were confined to their homes and were only allowed to leave them to purchase food or receive medical care.

The questionnaire is anonymous and the details were automatically sent to an Excel spreadsheet (Microsoft Corp. Redmond, WA.) using Google Forms (Google Mountain View, CA). The questionnaire has two parts. The first part is a survey of personal demographics and a questionnaire about specific issues related to COVID-19:

1. Gender: Male/female/other
2. Age: ___
3. Who lives in your household?: spouse/parent/children/brothers and sisters/flat mate/alone
4. In which hospital do you work?: Ein Kerem/ Mount Scopus
5. What is your position in the hospital?: senior doctor/resident/nursing staff/intern/clerical staff/other
6. In what department do you work? Internal medicine/other
7. Are you currently working?: in the hospital/home isolation/maternity leave/on work leave without payment
8. The following are risk factors for COVID-19. Do you have any of them?: diabetes/obesity/hypertension/chronic heart disease/chronic lung disease/smoker
9. Have you been in isolation because of the coronavirus?: yes/no
10. Have you have been tested for COVID-19?: yes/no
11. Was the test?: positive/negative/results not received
12. Of all of the following, which is of the most concern?: getting corona/infecting family/giving corona to patients/my children when I am in hospital/financial problems/loss of professionalism/other
13. Of the following, which would make the corona epidemic easier for you?: better protective gear/framework for my children/psychological support/group support/financial help/other
14. What percentage do you estimate that you already have gotten the coronavirus?: ___%

The second part of the questionnaire is a validated Hebrew translation of the 20-question portion of the
State-Trait Anxiety Inventory for Adults (STAI) assessing anxiety state [5]. The full STAI is composed of 40 statements, 20 assessing trait anxiety (T-Anxiety) and 20 assessing state anxiety (S-Anxiety). In this study, only the STAI S-Anxiety scale was used. The list of questions can be found in Table 1. According to this inventory, the S-Anxiety scale requires that the participant describe how he or she feels 'now, at the present moment'. The scoring weight for the 10 anxiety present questions is: 1- Absolutely not; 2- A little; 3- Much; 4- Very Much. The scoring weight for the 10 anxiety absent questions is reversed. The total score varies from 20 to 80, and the higher the values, the greater the anxiety level. Normative values for the STAI-S are: male college student 36.47 ± 10.01; female college students 38.76 ± 11.95; male working adults 35.72 ± 10.42; female working adults 35.20 ± 10.61 [5].

Statistical analysis was performed using the Statistical Analysis System (SAS Institute Inc., Cary, North Carolina, USA, version 9.4). Normally distributed interval data were compared across the groups, using the 2-tail Student's t-test. Nominal data were assessed with the chi-square test and Fischer’s exact test.

3. Results

Up until the time of the survey, 28 of the L-3 H workers and 10 of the L-2 H workers had tested positive for COVID-19. During the period of April 9–23, responses were received from 45/59 (76.3%) of the internal medicine residents at the two centers. Ten out of 15 (66.7%) of the residents at the L-2 H and 35/44 (79.5%) of the residents at the L-3 H responded. All fully completed the questionnaire. Fifteen of the responders were female, with a mean age of 32.5 ± 3.1 years and 30 males, with a mean age of 33.43 ± 3.8 years.

The mean total STAI-S score of all of the residents was 44.7 ± 13.1. The mean and SD of the response values to each of the questions of the STAI-S of the L-3 H and the L-2 H internal medicine residents in presented in Table 1. There was no significant difference between the values of the two groups for any of the questions. The highest value was for the statement: 'I feel secure' and the lowest value for the statement: 'I feel confused.'

The mean and SD of STAI-S scores and statistical significance of residents grouped according to L-3 H or L-2 H, male or female gender, presence or absence of risk factors for COVID-19 and having been tested or not tested for COVID-19 are presented in Table 2.

There was no significant difference between the percentage of residents tested for COVID-19 at the L-3 H (80%) and at the L-2 H (70%), p = 0.5. All of their tests were negative. There was no significant difference between the resident rating scores of their chance of having COVID-19 between those of the L-3 H (25%) and the L-2 H (17%), p = 0.3.

There was a significant difference between the number of the L-3 H residents, 22/56 (63%) and the L-2 H residents, 1/10 (10%) who indicated that the most important factor that would lessen their stress is better protective gear, p = 0.003. There was a significant difference between the number of L-3 H residents 19/35 (54%) and the number of L-2 H residents 1/10 (10%) who indicated that the possibility of infecting their families with COVID-19 was a major concern causing stress, p = 0.01. Only 14/45 (31%) of the residents indicated that having a COVID-19 test lowered their anxiety. Seven of
the residents (16%) reported risk factors (chronic lung disease, overweight, smoking) that may influence the prognosis of those with COVID-19 disease, but this was not correlated with anxiety measures. Only one resident responded that getting psychological support was important.

4. Discussion

The roles of the L-3 H and the L-2 H in the COVID-19 pandemic are very different. The L-3 H is a COVID-19 treatment center with a dedicated emergency room, intensive care unit, and separate wards for light, moderate and severe COVID-19 patients. The L-2 H has a COVID-19 emergency room but it does not hospitalize or treat COVID-19 patients. They are sent to the L-3 H for admission. Up until the time when the study survey was taken, 38 Hadassah workers, 28 in the L-3 H and 10 in the L-2 H, had been diagnosed with COVID-19 and several hundred others had been quarantined.

The current survey, using the STAI-S self-assessment anxiety questionnaire [5], was given to internal medicine residents of both hospitals at the height of the COVID-19 pandemic in Israel. In spite of having very different exposure to COVID-19 patients and different treatment roles, the mean STAI-S anxiety assessment scores of the L-3 H residents (44.8) and the L-2 H residents (44.4) were nearly the same. This may be influenced by the fact that internal medicine residents are used to treating severely ill patients. First-year internal medicine residents have been found to have high incidence of depression, emotional exhaustion and poor quality of life [6–8]. The COVID-19 pandemic presents an additional challenge to internal medicine residents. They are caring for patients who can also potentially transmit the disease to the residents themselves, with further transmission to the resident’s families possible [9].

While there are no published normative STAI-S values for internal medicine residents their values may be compared to previous published studies. The historical values for college male college students are 36.47 ± 10.01 and 38.77 ± 11.90 for female college students [5]. Knight et al. [10], consider a score above 39–40 to be suggestive of the presence of clinically significant symptoms. Bunevicius et al. [11], in a study of cardiac patients, consider the cut off value for clinical anxiety to be ≥ 45. They found the test to have a sensitivity of 89% and a specificity of 56%. Based on these studies, the internal medicine residents of both hospitals in this study can be said to be just below or at threshold of the level value indicating manifestations of clinical anxiety. The internal medicine residents’ responses to the STAI-S indicate that they felt secure and not extremely strained.

Where the internal medicine residents between the two hospitals differed was in their concern about protective gear and infecting their families with COVID-19. For the L-3 H residents, who were in the continuous battle front of COVID-19, 54% indicated that the possibility of infecting their families was a cause of stress and 63% indicated that better protective gear would lessen their stress. For the L-2 H residents, who except for duties in the emergency room were behind the battle lines of COVID-19, only 10% had concerns about these issues (p = 0.01, p = 0.003).

This may reflect the real difference in personal danger between the two groups. This is not a factor assessed by the STAI-S.

Lai et al. [4], reported on the mental health outcomes among health care workers exposed to COVID-19 disease in the hospitals of Wuhan China during the current pandemic. They found that among physicians, 45.6% suffered from depression, 40.6% from anxiety and 27.4% from insomnia. Sixty-six percent had symptoms of distress. There is no direct way of comparing their findings with the current study, but 9% of residents in this study reported very much strain and 16% very much tension. In the Lai et al. [4], study 24.3% of physicians had moderate distress and 8.7% severe distress.

A high percentage of the resident in this study (78%) had been tested for COVID-19. All tests were negative. Even though none of the internal medicine residents had tested positive for COVID-19 a high percentage (23%), still thought that they might have been infected. This may reflect the residents’ knowledge about the problems with test timing and possible false negative results of a single polymerase chain test for COVID-19 and the lack of serology testing as a measure of COVID-19 previous infection.

A strength of this study is that the assessment was done during the height of the COVID-19 pandemic in Israel. Also the two internal resident groups studied are unique in that they are in the same city, but have very different treatment roles and exposures in the pandemic. A validated anxiety tool, in use since 1983, was used for the assessment along with a questionnaire tailored to the COVID-
19 pandemic. Additionally, more than three-quarters of the residents responded to the questionnaire within a 14 four-day period. The weakness of the study is that there are no specific normative STAI-S values for internal medicine residents and the small study groups numbers.

The findings of the study are important. They show that creating a 'COVID-19 Free Hospital' did not alleviate internal medicine resident anxiety as would be expected when compared to their counterparts in the COVID-19 referral hospital. They do indicate that those in the front lines, in the L-3 H are most concerned about safety, both their own safety and the safety of their families. These concerns can be addressed by better and readily available protective gear and frequent staff COVID-19 testing [12].

**Disclosure statement**

The authors report no conflict of interest. No one other than the authors had a role in the gathering or preparation of data or in the writing of the manuscript.

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