
Qualitative Research

Has COVID-19 changed the workload for primary care physicians? The case of Spain

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Abstract

Background: The COVID-19 pandemic has led to a massive over-exertion of doctors, multiplying their work intensity, overload and stress. Yet no studies have been conducted on the changes in primary care physician overload during the pandemic.

Objective: To address this research gap, the aim of this article is to document the subjective dimensions of physicians' work during the peak of the pandemic for comparison with a pre-COVID-19 situation. In addition, the relationship between workload and the individual characteristics of the physician or the percentage of tele-assistance is examined.

Methods: This study performs a subjective measurement procedure for the analysis of work overload through the NASA-TLX questionnaire, with a total of 102 records from 16 doctors from a Primary Health Centers of the Granada-Metropolitan Health district (Andalusia, Spain).

Results: The results reflect a significantly higher workload during COVID-19 in relation to a previous situation (66.1% versus 48.6% before COVID-19). All the dimensions of the NASA-TLX test suffered an increase during the COVID-19, this increase being higher in the physical, temporal and frustration levels. Interestingly, the findings reflect the higher the percentage of telematic consultations, the lower workload.

Conclusions: Work overload and the emotional state of health workers is one of the many repercussions of the COVID-19 pandemic. The results derived from this study may be useful in formulating policies and practices related to the workforce development, funding streams to prepare for the next wave of COVID-19 infections as well as for future public health emergencies.

Key words: COVID-19, health care, Nasa-TLX, pandemic management, primary care physicians, workload

Context

Since January 2020, the struggle against COVID-19 has become the top priority of the countries. The pandemic is requiring an unprecedented massive over-exertion of health professionals, governments and public administrations and international agencies.

Due to the great social and economic impact of the COVID-19 pandemic (1) and to consolidate the lessons learned, it is necessary

to identify the main challenges that COVID-19 has highlighted in the health system. Auener *et al.* (2) point out that the COVID-19 crisis has led to major failures in the provision of health services, namely poor execution or lack of widespread adoption of the most known care processes, lack of coordination and even erroneous management decisions due to the financial stress of hospitals.

As Moazzami *et al.* (3) indicate, some of these health system errors have their origin in drastic changes in the workload of health

Key Messages

- The pandemic has not been evaluated either objectively or subjectively.
- This study performs a subjective measurement procedure for workload analysis.
- A total of 102 records from 30 primary care physicians were evaluated.
- Physicians reflect a significantly higher workload with the COVID-19.
- Overload was especially significant at the physical, temporal and frustration.
- Having relatives affected by the pandemic influences the overload (74.2 versus 58.6).

care providers, whose well-being, indeed, is the cornerstone of every well-functioning health system. The overwhelming burden of COVID-19 illness could have led to psychological distress among health care workers derived from long work hours, sleep disturbances and the risk of contracting infection and putting their family at risk of a life-threatening condition. Physicians' burnout and shortage of health care workforce has serious consequences for patients and could cause medical system to be on the verge of a devastating collapse (3).

Although some recent research argues that the workload of health care workers was greatly increased during the COVID-19 crisis, no study to date has objectively assessed the workload experienced by primary care workers during the COVID-19 crisis. Precisely, this is the first research that uses an internationally known subjective workload index, called the National Aeronautics and Space Administration–Task Load Index (NASA-TLX) (4), to compare the workload perceived by primary care personnel in Spain at two moments of special interest: the situation before and during the COVID-19 crisis. In addition, we shed light on the dimensions of the workload that have caused the most wear and tear on health care personnel. Finally, we explored whether individual physician characteristics, such as age, gender or seniority in the health system, and others derived from the new pandemic situation, such as tele-assistance, are associated with the perceived workload during the COVID-19 crisis.

Theoretical background

Workload in clinical practice

Although no widely accepted definition of mental workload exists, it is an interaction between the demands of the task and the performance of the operator (5). The most prominent risks are high levels of stress, which in turn lead to dissatisfaction, anxiety, frustration and irritation (6). Furthermore, there are other types of risks derived from overload, such as the absence of a sense of achievement (7) and physical repercussions such as insomnia or high blood pressure (8). In short, the consequences of work overload are broad and affect mental and physical health, quality of life and professional effectiveness of the sufferer (9).

Research on workload have had special interest in applied sciences, such as the health sector, where it has been highlighted that this overload is greater in health professionals compared with other work environments (10). This can be due to a wide variety of factors, both emotional and physical, as anxiety and depression (related to the suffering of the patient and the possible error in treatment and diagnosis) or the lack of social support, training and time (11,12).

Measuring workload in clinical practice

The principles that guide the measurement of mental workload, as part of the Cognitive Load Theory (13), are well established and these

reflect that there are different instruments, differentiated into two categories: objective and subjective. The first refers to the concrete repercussions on the worker's life, such as the tasks performed or the impact of the work environment (14). There are those that measure the increase in the difficulty of the task with work performance, and the use of physiological indicators, such as pupil diameter and heart rate (15). The second instrument, however, considers the worker's activities or emotional reactions to the experience in his work (14). Some of the subjective methods applied are WP (Workload Profile) and SWAT (Subjective Workload Assessment Technique). Finally, there is the Nasa-TLX test, which is developed in the present investigation and is up to now the most accepted and used due to its validity and ease of use (4). Among both instruments, the subjective instruments stand out because their advantages over others.

NASA-TLX as a workload measure

Despite the importance and widely recognized need to measure the perceived mental workload of workers, there are still few studies that have applied techniques such as Nasa-TLX in actual work settings (16).

In the health sector, the Nasa-TLX test has been commonly used for the analysis of burnout syndrome (17). In spite of the indications of the relationship between mental overload in doctors and the consequences that it produces in the safety of the patient (18) in the health care environment of primary care, there is a significant absence of evidence and application of methods of measuring mental overload in doctors.

Workload and individual and work delivery characteristics

Research in the business and public health sector has traditionally assessed how various characteristics of the workforce, such as age, gender or professional experience, relate to perceived workload. For example, Sharit *et al.* concluded that older employees perceive greater workload for balancing the more mentally challenging problem-solving tasks than the younger participants, even with increased exposure to the task (19). Conversely, Zakerian *et al.* (20) recently stated that on increasing the taxi drivers work experience, results in decreased mental workload. In the field of health care, Wihardja *et al.* (21) corroborated that age, work experience, education, marital status, nutritional status and career level were not significantly related to the mental workload of nurses.

The pandemic caused by the new SARS-CoV-2 coronavirus has had a very significant impact on daily clinical practice. The most important of these has been the appearance of telecare, which consists of the provision of health and social assistance to people in their homes or in the community, with the support of devices provided by information and communication technologies (22).

Research in the field of health care corroborates that these technologies and tools are and effective to allow remote and personalized

assistance to patients (22) and reduce the workload of the health provider (Fig. 2).

Fear of infecting the family during COVID-19: one of the main challenges for the physicians

To date, the number of worldwide health care professionals who have been infected with COVID-19 is very high (23). Recent research shows that this concern about contagion, and therefore the possibility of transmitting it to family and friends, is one of the greatest fears expressed by physicians. Because of this fear, many health professionals suffered self-isolation to protect their family and friends (24). The latter has led to a considerable increase in the feeling of loneliness, frustration and stress of physicians, and therefore serious psychological and psychological repercussions (25).

The current study

Considering the research gaps mentioned above, this research is precisely the first empirical study that objectively evaluates, using a widely recognized scale, namely Nasa-TLX, the workload experienced by primary care staff during the COVID-19 crisis in Spain. More specifically, this research has three main objectives: (i) to compare the workload experienced by primary care personnel before and during the COVID-19 situation, (ii) to explore the subjective dimensions of work overload that have been made worse by the COVID-19 situation with respect to a situation of normality and (iii) to identify whether there is an association between the workload experienced with COVID-19 and individual characteristics of the physician (namely, age, gender, professional experience and existence of family members admitted by COVID-19), as well as to assess the extent to which tele-assistance is being implemented in the pandemic crisis situation.

Method

Measures

The Nasa-TLX (Task Load Index) instrument was used to assess mental workload. As defined by the authors, Nasa-TLX is a multi-dimensional assessment procedure that gives an overall workload score, based on a weighted measure of the scores on six subscales, aimed at defining the relevant factors in the subjective experience of workload: mental demand or requirement, physical demand or requirement, time requirement (feeling of time pressure), performance (degree of achievement of objectives), effort (physical and mental) and level of frustration (feeling of pressure, discouragement or insecurity) (4).

Its application requires two phases. The first consists of obtaining the score of each individual in each of the dimensions of the test on a scale from 1 to 21, where 1 is the lowest level and 21 the highest (Supplementary Material). The second phase consists of the measurement and weighting of the scores through the established binary weights that convert the scores into a global scale out of 100 where the weighting and the effect of the set of factors on the subjective overload are shown (26). The application of the Nasa-TLX test was carried out before and during the COVID-19 in the same primary care centre. The results of the internal consistency analysis (Cronbach's α) of the Nasa-TLX scale was acceptable in the situation before ($\alpha = 0.661$) and during COVID-19 ($\alpha = 0.803$) (27).

Apart from sociodemographic-related questions of age and gender, the participants had to answer about their years of experience in primary care and the level of telematic consultations carried

out. They were also asked if they had family members admitted for COVID-19 at the time of the survey.

Study population

The pre- and post-COVID-19 data were carried out at the same Health Centers of the Granada-Metropolitan Health District, Spain. On the one hand, the study prior to the COVID-19 was carried out in the months of March and April 2017, when 102 records were collected by six primary care physicians. And, on the other hand, the current study, which was conducted during the month of April 2020 at the height of the initial peak of the COVID-19 pandemic, over a period of 2 weeks with a total of 132 records from 30 general practitioners. In both studies, all the doctors at the centre were selected, voluntarily and in an informed manner, with the authorization of the medical management and the very interested collaboration of all the professionals. Dependent sample *t*-tests showed that there were no differences between the age (pre-COVID = 48; post-COVID = 49.8) and gender (pre-COVID = 52% female; post-COVID = 54% female) of the physicians analyzed in the pre- and post-COVID situation.

An online questionnaire was used to collect records using the Qualtrics software, which was answered using a smartphone browser, which was given at the end of the working day, at the same workplace and on specific days chosen at random.

Analysis

Paired sample *t*-tests were used to compare total weights and general scores of NASA-TLX dimensions between the work situation before, versus during the COVID-19 situation, by comparing the cases pre- and post-COVID-19. To examine whether there were significant differences in the subjective experienced workload during the COVID-19 situation between males and females, a Mann-Whitney *U* test was developed in the statistical software IBM Statistical Package for the Social Sciences (IBM SPSS Version 20). To evaluate the correlation of general NASA-TLX scores (and the corresponding NASA-TLX dimensions) with the work experience, age and level of telemedicine, Pearson correlation coefficients were calculated.

Findings

NASA and dimensions

A paired sample *t*-test indicated that health providers experienced significantly higher workload, as indexed by the general scores of NASA-TLX, during COVID-19 (M during_{COVID-19} = 66.1; SD during_{COVID-19} = 16.8) relative to the previous COVID situation (M previous_{COVID-19} = 48.6; SD previous_{COVID-19} = 12.6) ($t[48] = -8.15$; $P < 0.001$).

When looking at the changes in the six dimensions, health providers reported significant higher workload levels during COVID-19 in all the dimensions, as seen in Figure 1 ($P < 0.001$). The most important increase in absolute terms was by far the increase in the temporal and demand followed by the mental, effort and physical demand. It worth noting that the dimensions with the strongest changes are physical demand (almost double), temporal demand (more than double) and frustration (almost double). It is worth bearing in mind that the following remained almost unchanged satisfaction, success and performance.

Associations between workload and individual and work delivery characteristics

A Mann-Whitney *U* test did not find significant differences in the subjective experienced workload during the COVID-19 situation

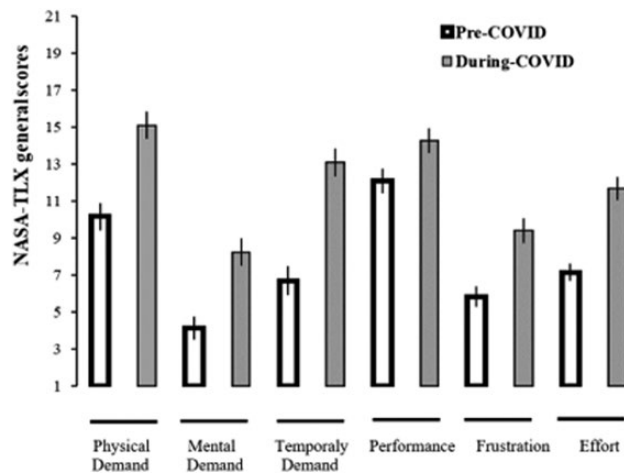


Figure 1. Results of the paired sample *t*-test comparison. *y* axis: NASA-TLX general scores (at); *x* axis: dimensions of the NASA-TLX scale. The experienced workload of health providers during COVID-19 is significantly higher within all the NASA-TLX dimensions ($P < 0.001$). Error bars indicate standard deviation.

between males and females ($P > 0.05$). Pearson correlation coefficients revealed: First, the health providers using more telematic consultations during COVID-19 reported significantly lower levels of workload ($P = 0.013$, $r = -0.447$). When evaluating this correlation between each of the NASA-TLX dimensions, this correlation was significant for the temporal workload ($P = 0.05$, $r = -0.361$) and frustration ($P = 0.048$; $r = -0.364$). Second, no significant association was found between workload and years of experience in the primary attention ($P = 0.51$; $r = 0.123$). Third, a significant positive correlation was reported between workload and age ($P = 0.001$; $r = 0.477$) (Fig. 2).

Next, this research analyzed whether the existence of family members of physicians admitted by COVID-19 impacted their overall workload, as well as any particular NASA dimension. Independent sample *t*-tests showed that physicians with family members admitted for COVID-19 experienced higher significant overall workload (mean workload physicians with the family members = 74.2; mean workload physicians without the family members = 58.6; $P < 0.001$). Interestingly, the dimension of NASA that physicians with family members affected by COVID-19 experienced most was frustration (mean workload physicians with the family = 10.4; mean workload physicians without the family members = 8.1; $P < 0.02$).

Conclusions

The COVID-19 pandemic has had a serious impact on health systems around the world. There are numerous information and research gaps on the subject, and although some research advocates for increased mental overload for physicians, there is no study that objectively assesses such workload (28). This study is the first to analyze the subjective mental overload of primary care medical staff during the COVID-19 situation and is a precedent in research seeking information on the workforce during the COVID-19 in Spain.

In line with the general objective, the results of the NASA-TLX test of our study show a higher level of mental overload by primary care physicians during the COVID-19 period compared with a situation of normality. More specifically, the results derived from the NASA-TLX by specific dimensions of overload confirm what has

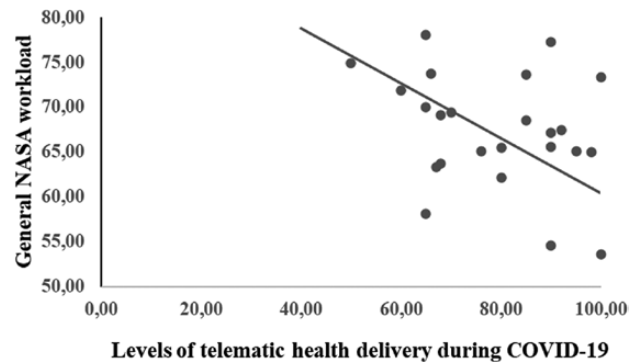


Figure 2. Plot showing the correlation between workload as indexed by the general NASA-TLX scores and the levels of telematic health delivery during COVID-19.

already been evidenced on previous occasions. Primary care is characterized by certain attributes and singularities that differentiate it substantially from the hospital setting (29). This, together with the addition of increased home visits during COVID-19 by doctors, appears to have led to an increase in the amount of physical activity or difficulty in carrying out consultations (physical demand), the level of time pressure perceived by doctors (time demand) and the stress, insecurity and irritation in decision making by doctors (level of frustration).

In relation to the possible associations between the perceived workload during COVID-19 and individual circumstances, the present study reflects a significant decrease in the subjective overload of doctors at higher percentages of tele-assistance and tele-consultations, this reduction being greater in the case of temporary demand and frustration. The reduction of these dimensions above the rest may be due to the greater flexibility in time that the doctor has in the telecare system, which differs from the stipulated and marked times in the physical consultation. These results coincide with the scientific evidence on how tele-assistance can facilitate and simplify the work of professionals and decompress the collapse in the consultations of our primary care physicians (30). However, no significant association was found between workload and years of experience in the primary care. Although there is no previous evidence in the field of primary care in this regard, this result confirms what has already been shown in other work environments (31). On the contrary, it does seem to exist, as some previous research predicts, that there is a negative effect on the doctor, when it comes to suffering or presenting fear and fear of infecting family and friends (32). This negative effect, in our study, translates into an increase in the work overload of the doctor in general terms, and especially in the dimension of frustration and is that, as in other publications, there is a relationship between emotions such as frustration, negativity and discouragement in people whose relatives are affected or admitted with Covid-19 pathologies (33,34).

Our results take a step forward in the study of mental workload of health workers, demonstrating experimentally this variation of overload in primary care physicians in Spain. These results are shown in turn divided by those specific dimensions in which this level of overload develops, being the first study to be carried out during the pandemic.

The implementation of this study protocol faced some challenges. First, despite the homogenization of the sample in Granada, it would have been interesting to corroborate our results in other cities in Andalusia or countries. In addition, we are faced with the

NEEDS	OBJETIVES	AVENUES OF INTERVENTION
Increase physician workload scores with new elements brought about by COVID-19 patient care, including time to put on and take off personal protective equipment	Improve the stress and overload produced by the time available during the working day, especially the temporary and physical demand	Increase the availability of consultation time for doctors by reducing the non-direct clinical workload
Distance communication between the patient and their relatives	Reduce the stress and burden of the new form of telemedicine	Increase the telephone classification and improve the protocols and tools of doctors for the correct use of telemedicine
Manage the increasing incidence and severity of agitation and delirium due to the environment	Reduce the overload and stress associated with the context	Establishing strategies to reduce the health-seeking behaviors of patients to increase self-care
Increase social support and feeling of support from the physicians	Reduce the stress generated by the feeling of abandonment and the frustration.	Skills training to increase social support and management of negative emotions
Enhance the recovery of the physicians' daily stress and overload	Reduce stress and exhaustion suffered after a specific period, improving mental and physical rest.	Application of relaxation techniques such as Mindfulness, progressive muscle relaxation, yoga, physical activity...
Manage the fear of self and family contagion.	Reduce or alleviate the level of frustration and fear generated in the doctor, by being able to infect their family members.	Social support groups in case of isolation and psychological help.

Figure 3. Proposals or intervention measures to reduce or improve the physician's work overload.

intrinsic and inherent limitations of subjective studies, which involve factors and biases of assessment (35).

The results of our research can be extended with new future lines of investigation such as its application in other countries or in different health professionals. To a large extent, these modifications have to go with the aim of improving the organization of the working day (36) and in measures that help or offer support in the management of stressful situations due to related clinical problems with COVID (37,38) (Fig. 3).

In conclusion, the contribution provided by this study on the sources of workload in primary care doctors will allow those responsible for these to modify the functions and variables required in the posts.

Supplementary material

Supplementary material is available at *Family Practice* online.

Declaration

Funding: none.

Ethical approval: local ethical committee (World Medical Association, 2013).

Conflict of interest: none.

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