

## ORIGINAL ARTICLE

# Acne care in health care providers during the COVID-19 pandemic: A national survey

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## Abstract

The medical face mask, widely used by health care providers (HCPs) during the COVID-19 pandemic, is reported to be associated with adverse reactions, among which acne is one of the most common. This study aims to evaluate treatment strategies employed by HCPs affected by acne in association with prolonged medical face mask use, their openness towards accessing telemedicine as a patient, and other lifestyle factors with potential influence on the evolution of their acne. Our online-based cross-sectional survey was distributed between December 17, 2020, and February 17, 2021, and targeted HCPs from different medical centers in Romania. From the  $n = 134$  respondents, 50% reported current acne lesions and 56.7% required treatment. Of the latter, 65.8% self-medicated and 34.2% sought medical advice. The most common treatment associations between anti-acne topical products were: retinoids and salicylic acid (18.18%;  $n = 8$ ), retinoids and benzoyl peroxide (13.64%;  $n = 6$ ), salicylic acid and benzoyl peroxide (13.64%;  $n = 6$ ), and azelaic acid together with salicylic acid (9.09%;  $n = 4$ ). The health care provider responders were reluctant to use telemedicine, as only 14.2% participants were open to telemedicine. Our results suggest inadequate management of acne in HCPs using medical face masks. As with other occupational hazards and proper usage of personal protective equipment, HCPs should receive adequate screening, training, and treatment for this condition.

## KEYWORDS

acne, health care providers, medical face mask, personal protective equipment, treatment

## 1 | INTRODUCTION

A considerable amount of published data are available regarding irritant and allergic contact dermatitis in health care providers (HCPs), as these occurrences were previously described, together with strategies to prevent them.<sup>1,2</sup> Reports of acne in HCPs before the COVID-19 pandemic are less frequently mentioned in the literature. Ever since the 2006 SARS epidemic in Singapore, Foo et al.<sup>3</sup> have identified acne in HCPs in association with the usage of medical face masks. From the beginning of the COVID-19 pandemic, more articles on this topic

have emerged as more HCPs became exposed to the prolonged use of medical face masks.<sup>4-11</sup> However, although affected by acne, HCPs chose not to seek medical assistance, resorting to self-medication or ignoring the problem until it becomes more severe.<sup>3,12</sup>

In addition to physical personal protective equipment (PPE) meant to prevent the personnel from getting infected, other strategies are also being employed, such as telemedicine, regarded by Hirschmann et al. as an electronic PPE.<sup>13</sup> Through the help of this technique, access to medical services continues to be granted to patients while ensuring staff safety and providing environmental sustainability.<sup>14-16</sup>

This study aims to assess the types of acne lesions present in areas affected by the medical face mask, coupled with employed

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management strategies and openness toward accessing telemedicine services as a patient.

## 2 | MATERIALS AND METHODS

Our data set consists of a cross-sectional, online survey applied to HCPs, consisting of 41 items, delivered in Romanian, and developed using Google Forms. The study link was posted on social media groups of HCPs and was also delivered to individuals by email or WhatsApp, together with the invitation to forward the message to other colleagues.

The first page of the form contained the informed consent. Only after explicit acceptance were participants capable of completing the questionnaire; they were asked to answer only once and could withdraw from the study at any point. Answers were continuously recorded from December 17, 2020, until February 17, 2021. Participants were asked to consider the lockdown period (from March 16, 2020, until May 15, 2020) and, separately, the 7–9 months following the lockdown (i.e., an average period of 8 months), depending on the time of response. We evaluated other lifestyle factors that may influence the development or worsening of acne lesions and adjusted for them in a multivariate analysis. Part of this data set was used for different inquiries, and the corresponding results are presented in a study by Cretu et al.<sup>17</sup>

Information regarding demographics and lifestyle was recorded. We specifically assessed the ever-presence of acne, the current acne state, facial lesions occurrence in the time interval from the beginning of the pandemic up until the time of their response, number of consecutive hours in which the usage of medical face masks was required at work and shiftwork. We questioned the presence of treatment, who made the treatment choice, the amount of budget allocated for this treatment, and corresponding satisfaction. Participants chose from a predefined list the ingredients frequently found in their products and could answer freely by adding active substances. Participants self-reported symptoms by choosing the types of lesions and the involved regions. Lifestyle details were also recorded, such as sleep duration and diet during and after the lockdown. In addition, the questionnaire assessed openness toward accessing health care services through telemedicine as a patient.

The English translation of the questionnaire is available in Data S1. The Romanian version is available upon request.

The survey was distributed to people directly involved in patient care in the hospital and outpatient settings. Doctors, nurses, and other categories of HCPs chose to participate. Participants were classified according to their year of birth using the categories defined by Pew Research to observe patterns and common behavioral traits per generation: Baby Boomers (born 1946–1964), Generation X (born 1965–1980), Millennials (born 1981–1996), and Generation Z (born 1997–2012).<sup>17–19</sup>

For the statistical analyses, we used descriptive statistics, within- and between-subject tests, as well as association measures and logistic regressions; we considered a  $p$ -value  $< 0.05$  as statistically

significant. Data mining techniques, specifically the Apriori algorithm from Weka 3,<sup>20,21</sup> with support set at 10% and confidence at 90% for rule mining, were used for questions assessing lesion type, affected area, and anti-acne products used. Microsoft Excel 16 and IBM SPSS version 28 were used to analyze the data.

This study protocol was reviewed and approved by the Research Ethical Committee of “Carol Davila” University of Medicine and Pharmacy, Bucharest, Romania, approval number 30525/23.11.2020. The study was conducted according to the principles of the Declaration of Helsinki. The patients included in this study have given written informed consent to publish their case details. This aspect was clearly stated in the informed consent form at the beginning of the survey.

## 3 | RESULTS

A total of  $n = 134$  answers were recorded by February 17, 2021. Most participants were women (86.6%;  $n = 116$ ), and most were doctors (79.9%;  $n = 107$ ). While considering analyses targeting generational differences, six individuals were excluded because they did not provide details regarding their birth date. Millennials were the generation with the highest representation (74.62%;  $n = 100$ ).

The most frequently encountered individual problems with people exhibiting acne were: black dots (59.7%;  $n = 80$ ), red papules (54.5%;  $n = 73$ ), rash (44.8%;  $n = 60$ ), erythema (41.8%;  $n = 56$ ), nodules (29.1%;  $n = 39$ ), itch (27.6%;  $n = 37$ ), and scales (26.9%;  $n = 36$ ). The longest patterns of frequent co-occurring conditions included four problems each, namely: (a) red papules, black dots, erythema, and rash (11.9%;  $n = 16$ ), and (b) black dots, erythema, rash, and itch (10.4%;  $n = 14$ ). In terms of rule mining, a pattern emerged: if individuals exhibited black dots, erythema, and either itch or scale, then they also suffered from a rash (confidence of 93%).

Cross tabulation for acne onset and current acne treatment was performed. Of the entire study population, 50% of participants ( $n = 67$ ) reported currently having acne lesions; out of these individuals, 56.7% ( $n = 38$ ) reported using specific treatment. Additionally, 9% ( $n = 6$ ) self-identified as not having acne but were using anti-acne medication. As expected, we found that more people reported using treatment as the pandemic prolonged in a longitudinal analysis for the two timeframes, specifically during and after the lockdown.

While analyzing the correlation between the emotional impact of acne lesions and the current usage of anti-acne medication, cross-tabulations highlighted that the people with a higher emotional impact of the acne lesions were more likely to report acne treatment use ( $\chi(4) = 21.876$ ,  $p < 0.001$ ). Of those who stated current use of treatment, none reported a complete lack of emotional impact of acne lesions, 20.5% ( $n = 9$ ) reported that they had a small impact, 47.7% ( $n = 21$ ) moderate, 18.2% ( $n = 8$ ) high, and 13.6% ( $n = 6$ ) very high.

The most commonly used anti-acne topical type of products was based on salicylic acid, as reported by 61.36% ( $n = 27$ ) participants, followed by topical retinoids (40.91%;  $n = 18$ ), benzoyl peroxide (20.45%;  $n = 9$ ), azelaic acid (18.18%;  $n = 8$ ), and topical antibiotics (9.09%;  $n = 4$ ). We identified several common frequently occurring

**TABLE 1** Reported lesion types and treatment used for their management

Types of reported lesions	Treatment used					
	No treatment	Azelaic acid	Salicylic acid	Benzoyl peroxide	Topical antibiotics	Retinoids
Red papules	57.50% (n = 42)	9.60% (n = 7)	26.00% (n = 19)	11.00% (n = 8)	5.50% (n = 4)	17.80% (n = 17)
Black dots	60.00% (n = 48)	7.50% (n = 6)	26.30% (n = 21)	10.00% (n = 8)	3.80% (n = 3)	15.00% (n = 12)
Painful nodules	56.40% (n = 22)	10.30% (n = 4)	28.20% (n = 11)	15.40% (n = 6)	7.70% (n = 3)	12.80% (n = 5)
Erythema	60.70% (n = 34)	7.10% (n = 4)	21.40% (n = 12)	8.90% (n = 5)	5.40% (n = 3)	23.20% (n = 13)
Itch	62.20% (n = 23)	8.10% (n = 3)	27.00% (n = 10)	5.40% (n = 2)	5.40% (n = 2)	16.20% (n = 6)
Scales	63.90% (n = 23)	2.80% (n = 1)	22.20% (n = 8)	8.30% (n = 3)	2.80% (n = 1)	19.40% (n = 7)

associations between these substances: retinoids and salicylic acid reported by 18.18% ( $n = 8$ ) participants, retinoids and benzoyl peroxide by 13.64% ( $n = 6$ ), salicylic acid and benzoyl peroxide by 13.64% ( $n = 6$ ), as well as azelaic acid and salicylic acid by 9.09% ( $n = 4$ ). The association between anti-acne treatment and lesion type was performed using cross-tabulations (Table 1).

Satisfaction with the chosen treatment was assessed through a Likert scale, and recorded answers showed a normal distribution. Pearson's correlation tests were performed to investigate the correlation between the different emotional impacts and satisfaction with treatment; nevertheless, no significant results were observed. In addition, we did not find any association between who made the treatment choice (participant or doctor, dermatologist, or different) and an influence on the degree of satisfaction with treatment. Of the  $n = 38$  participants who reported current acne, 65.8% ( $n = 25$ ) made the treatment choice themselves, and 34.2% ( $n = 13$ ) consulted a doctor on this matter. A low but significant correlation was observed between satisfaction with the treatment and the corresponding investment ( $r = 0.266$ ,  $p = 0.027$ ).

Regarding the openness toward telemedicine, participants in our cohort exhibited a low degree of acceptability; 14.2% ( $n = 19$ ) reported previously using telemedicine, and 10.9% ( $n = 11$ ) reported its usage for acne treatment. While considering the likelihood of telemedicine usage, 5.2% ( $n = 7$ ) were completely against it, 38.8% ( $n = 52$ ) were skeptical and thought it highly unlikely, 29.1% ( $n = 39$ ) were in balance, 20.1% ( $n = 27$ ) were positive, while only 6.7% ( $n = 9$ ) were absolutely in favor of the technique. A Kruskal-Wallis H test was performed and showed that there was a statistically significant difference in the likelihood of telemedicine use between the five categories of emotional impacts,  $\chi^2(4) = 22.148$ ,  $p < 0.001$ , with a mean rank likelihood of telemedicine use of 56% for individuals reporting no impact associated to the pandemic, 58% for little impact, 65.49% for moderate impact, 99.15% for high impact, and 51.82% for very high impact. As expected, people more impacted by the pandemic became more open to telemedicine, except for the last group, who was still skeptical regarding this technology, despite having reported that the pandemic highly affected their emotional well-being. The reasons for this finding were not assessed in our questionnaire; potential arguments may include a lack of experience with this technique or previous negative interactions while using it.

While accounting for other lifestyle factors, we found that most participants reported protein-rich diets and eating cheese. In addition, there were no significant changes in diet during or after the lockdown.

In terms of sleeping habits, Wilcoxon Signed-Ranks tests were conducted to observe changes in behaviors. There were no changes between the sleep duration in general and the sleep duration during the lockdown ( $Z = -0.464$ ,  $p = 0.643$ ), while the subsequent effects after the lockdown were statistically significant (i.e.,  $Z = -1.968$ ,  $p = 0.049$  between the sleep duration during vs. after the lockdown, with an even higher offset between the sleep after the lockdown and general sleeping habits  $Z = -2.558$ ,  $p = 0.011$ ). As such, individuals started sleeping fewer hours, but the effect was not immediate at the beginning of the pandemic; it became more noticeable after the lockdown. Similarly, a Wilcoxon Signed-Ranks test indicated that people traumatized lesions by excoriation more frequently during the post-lockdown period ( $Z = -2.496$ ,  $p = 0.013$ ) in contrast to the lockdown period, which in return was not significantly different from their general habits ( $Z = -1.433$ ,  $p = 0.152$ ).

Logistic regressions for both the lockdown period and the following 7–9 months were performed to ascertain the effects of the number of hours required to wear the medical face mask, shiftwork, diet, and sleep duration on the likelihood that participants had acne. However, the models were not statistically significant; this may be due to acne requiring a broader context not grasped by these variables.

## 4 | DISCUSSION

In HCPs with acne in prolonged medical face mask usage, the micro-environment, inclusively the local microbiota, is altered. In addition, the skin barrier function may be compromised due to friction.<sup>8,12,22</sup> This aspect may increase the irritant potential of classical anti-acne treatments such as topical retinoids or topical benzoyl peroxide.<sup>22</sup> Moisturizers must be chosen carefully to avoid additional occlusion of pilosebaceous follicles.<sup>12,22</sup> As such, individualized approaches are necessary for these cases. In our study, when treatment was considered necessary, most responders reported self-medication.

Although the majority of participants were young female doctors, treatment choices and associations were rarely the ones recommended as first-line therapy by guidelines.<sup>23,24</sup> Foo et al.<sup>3</sup> suggested

that since the participants in their study did not seek medical advice or treatment for their lesions, they were probably affected by mild or moderate acne. The participants from our cohort reported a high emotional impact of the lesions, and those who were more affected tended to seek help. Few individuals reported acne treatment despite not self-identifying as having acne; one possible explanation could be disagreements regarding minimal criteria for acne diagnosis.<sup>25</sup>

COVID-19 and medical face masks have influenced acne in many ways. The latter has a significant impact on acne. Its usage has been shown to exacerbate preexisting acne in HCPs and the general population or induce new lesions in previously unaffected people.<sup>26-29</sup> Several mechanisms are involved, namely friction, occlusion, moisture, changes in sebum composition, increase in local temperature, and alterations of cutaneous microbiota.<sup>26,30</sup> People with sensitive skin have been shown to have a higher likelihood of mask-related adverse events.<sup>26</sup>

Although the COVID-19 infection does not present with acne or acneiform lesions, it may involve people with preexisting acne receiving systemic therapies, who may be concerned regarding the interaction between their treatment and the infection.<sup>31-34</sup>

The literature available on this topic is still limited; however, current information shows that acne patients under oral isotretinoin or doxycycline treatment at the time of the infection did not present with worse COVID-19-related outcomes, and findings suggest that these drugs may have a positive influence on the course of the infection.<sup>32-34</sup>

Discomfort related to skin conditions may lead to improper use of PPE, compromising its utility.

Itch is one of the most common reasons for improper mask use.<sup>35</sup> In those with associated conditions, such as acne, itch may be more prevalent.<sup>36</sup> Reszke et al. found that HCP did not fully adhere to the World Health Organization guidelines for the correct use of medical face masks. Those who reported itching and associated skin conditions were more prone to go against recommendations, and particularly reported touching the mask more frequently.<sup>35</sup>

Addressing underlying skin conditions, such as acne, may potentially alleviate itch and perhaps enhance compliance with the correct use of medical face masks.

In our population, more than half of those who reported treatment used salicylic acid (61.36%) and the most common treatment association was with topical retinoids (18.18%). These treatment choices and associations have the potential to irritate the skin, particularly in cases with weakened skin barrier. These circumstances may accentuate itch, with unwanted consequences on the correct use of medical face masks.

Lee et al.<sup>12</sup> suggest shorter shifts, frequent breaks every 2-3 h, and rest in non-contaminated areas for HCP to minimize the impact of skin conditions resulting from PPE use.<sup>12</sup> As such, management practices and regulatory measures need to be introduced to prevent or limit the impact of acne as an occupational disease in affected HCPs.

Telemedicine may assist HCP both as patients and as professionals. Chowdhury et al.<sup>37</sup> have presented such an intervention for

HCPs in the UK. Fluhr et al.<sup>16</sup> reported that both patients and treating dermatologists were satisfied with tele dermatology use in crises such as the one caused by the COVID-19 pandemic. However, in their study, patients were more open to telemedicine in the future compared with physicians.<sup>16</sup> Reluctance regarding the use of telemedicine by the HCP from our cohort in their capacity as patients was surprising, considering that most of the cohort consisted of young individuals. Although not evaluated in our study, this hesitancy may also be due to a preference for a physical consultation.

In contrast to our previous report,<sup>17</sup> this article presents a detailed and in-depth analysis of the strategies HCPs affected by acne use to care for their condition. An important aspect of receiving adequate treatment for their particular case is reaching out to professional dermatologists. Telemedicine has the potential to bridge the interaction between HCPs in need of medical assistance and dermatologists. However, as many HCPs were reluctant to use it, periodic in-person visits may prove more useful.

The limitations of our study include a small cohort, an imbalance within the study population in terms of gender and generation, a focus on the lesions affecting the face, and the absence of a clinical evaluation of the participants. We did not assess the type of medical face masks used by HCP. Also, having retrospectively asked questions, the answers are subject to recall bias. Although the study methodologies used are considered acceptable in the literature, they do not enable the estimation of the response rates.<sup>35,36,38-40</sup>

Participants could select answers regarding other inflammatory skin conditions; however, we did not assess for a history of eczema or allergies.

## 5 | CONCLUSIONS

Our results from a national survey suggest inadequate treatment of acne in relation to medical face mask usage. Similar to how all workers receive training and education concerning other occupational hazards and proper PPE usage, HCPs should receive clear training, adequate screening, and treatment for adverse reactions relating to PPE use.

Although telemedicine has shown great promise in offering care to patients in need throughout the COVID-19 pandemic, our results suggest that HCPs are reluctant to use it in their capacity as patients. Other ways to approach this population, such as in-person visits, may be required.

This pandemic was more intense than the previous ones, nevertheless, it is unlikely it will be the last. As such, all the lessons we can learn in this context may prove valuable for the future. Observations from diverse populations, with distinct geographic and cultural backgrounds, may provide more resilience to such challenges.

## AUTHOR CONTRIBUTIONS

Stefana Cretu and Carmen Maria Salavastru designed the study. Stefana Cretu supervised the study and was responsible for patient recruitment, data collection, and drafting of the manuscript. Mihai Dascalu was a major contributor in writing the manuscript, performed

the data analysis, and critically revised the manuscript for important intellectual content. Carmen Maria Salavastru was a major contributor in writing the manuscript and critically revised the manuscript for important intellectual content. All authors read and approved the final manuscript. All authors had full access to all of the data in this study.

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## CONFLICT OF INTEREST

The authors have the following conflicts of interest to disclose: Stefana Cretu and Mihai Dascalu, report no conflicts of interest. Carmen Maria Salavastru declares the following, not related to the work: royalties from Springer Nature, consulting fees from Vichy International and support for attending meetings from Leo Pharma.

## DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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#### SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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