

Significant Increased Headache Presentations to the Acute Medical Unit Coinciding with Universal Masking

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Abstract

Aims

We explored the impact of universal masking recommendations with temporal trends in headache presentations to our acute medical unit. We explored numbers of headache presentations and any concomitant changes in carbon dioxide (CO₂) levels of patients.

Methods

We compared all patients presenting with acute headaches to our acute medical unit from June 2020 to August 2020 and from June 2019 to August 2019.

Results

We found that there was a 2.9 fold rise in the absolute number of patients presenting with headaches to the acute medical unit from 2019 to 2020 (113 vs 329). There was no statistically significant difference in mean CO₂ levels (23.318 vs 23.07, $p = 0.27$).

Conclusion

We found a large increase in headache presentations to our acute medical unit. This may represent a new phenomenon of “mask-induced headaches” in the general population. There was no rise in average CO₂ levels from 2020 to 2019, which we believe is an important message to combat the spread of fake news surrounding mask wearing.

Introduction

COVID-19 presented significant challenges in provision of acute medical care. Our institution adapted by reconfiguring the acute medical unit (AMU), with direct triage of all medically stable patients to AMU from ED. Coinciding with this reorganization, self-imposed mask wearing had seen exponential increases, with month on month increases seen internationally in the proportions wearing face masks ¹.

There is good evidence that universal masking can help reduce the transmission of COVID-19 infections ², but despite this there have been concerns in the media that there have been increases in the proportion of people suffering from headaches, with hypercapnia the putative mechanism behind this reported increase ³. We sought to examine temporal trends in headache presentations, and to examine if there was any change in CO2 levels among patients with headaches.

Methods

A prospectively maintained logbook was reviewed. All patients presenting to the AMU with headache between June 2020 and August 2020 were included and compared. This time period was after the Irish National Public Health Emergency Team (NPHET) recommendations for the use of face coverings in situations where physical distancing is challenging ⁴. We compared a similar time period of June 2019 and August 2019, to account for seasonality in presentations to the AMU. Proportions were compared using the Chi-square test, and means were compared using the t-test.

Results

We found that in the two corresponding time periods there was a 2.9 fold rise in the absolute number of patients presenting with headaches to the acute medical unit (329 vs 113) (Table 1). There was no statistically significant difference in mean carbon dioxide levels (23.318 vs 23.07, $p = 0.27$). From 2020 to 2019 there was no difference in patient mean age, proportion who were female, or use of neuroimaging (Table 1). There was a statistically significant difference in the proportion of neuroimaging that had clinically significant abnormal findings (8.9% vs 1.1%, $p = 0.01$). There was a statistically significant reduction in the proportion of lumbar punctures performed (8.8% vs 18.1%, $p = 0.006$).

Table 1: Results

	June-Aug 2019 N = 113	June-Aug 2020 N = 329	P value
Mean CO2	23.07	23.318	0.27
Mean Age	44	47	0.12
% Female	62.6%	62.1%	0.87
Neuroimaging performed	79.6%	79.3%	0.93
Abnormal findings on Neuroimaging	1.1%	8.9%	0.01
Lumbar Puncture performed	18.1%	8.8%	0.006

Discussion

We have demonstrated a significant increase in the number of patients presenting to our acute medical unit with headaches over a corresponding time period. We feel that this may represent a new phenomenon of “mask-induced headaches”, given that a large proportion of patients presenting during the 2020 time period would have been wearing face masks. Healthcare workers have been demonstrated to develop de-novo PPE-associated headache or exacerbation of their pre-existing headache disorder ⁵, and we believe this is a phenomenon among the general population as well. Healthcare workers should consider this in their differential diagnosis when assessing patients with new onset headaches.

The pathogenesis of mask-induced headache could be explained by several different factors. Mechanical factors may be considered, with pressure from a tight-fitting mask or mask ear loops contributing, or potential changes in upper airway conditions and nasal physiology ⁶. While our review did not collect routine data on hypoxemia, this is another potential factor reported from the wearing of the N95 mask for 4 hours, with significantly reduced PaO₂, chest discomfort and increased respiratory rate ⁷. Hypercapnia has been subject to much attention on social media as a potential cause, though our results do not support this, as we identified no difference in the average CO₂ levels from 2020 to 2019.

Some limitations should be noted. Firstly, owing to the time of year, dehydration could also be considered as a cause of headache, though to account for this we chose similar time periods in each comparative group. Consideration could also be given to an increased level of stress, a well-known trigger of headaches, owing to the pandemic.

In conclusion given our high patient numbers this supports the hypothesis that there is no association between mask wearing and hypercapnia. We believe this is an important message to help combat damaging misinformation on social media platforms ⁸. Promoting community mask wearing is important, as there is compelling evidence that we have little to lose, but potentially a lot to gain ⁹. There may be fluctuations in public health mask wearing recommendations in the future, and if routine mask wearing is ever reintroduced after a period without widespread use, clinicians should be aware of the association between the introduction of mask wearing and increased headache presentations.

Declaration of Conflicts of Interest:

The authors declare no conflict of interest.

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References:

1. Fisher KA, Barile JP, Guerin RJ, Vanden Esschert KL, Jeffers A, Tian LH, et al. Factors Associated with Cloth Face Covering Use Among Adults During the COVID-19 Pandemic - United States, April and May 2020. *MMWR Morb Mortal Wkly Rep.* 2020 Jul 17;69(28):933–7.
2. Wang X, Ferro EG, Zhou G, Hashimoto D, Bhatt DL. Association Between Universal Masking in a Health Care System and SARS-CoV-2 Positivity Among Health Care Workers. *JAMA.* 2020 Jul 14;
3. Partly false claim: Continually wearing a mask causes hypercapnia. Reuters [Internet]. 2020 May 5 [cited 2020 Sep 6]; Available from: <https://www.reuters.com/article/uk-factcheck-coronavirus-mask-hypercapni-idUSKBN22H2H1>
4. Use of face masks by the general public - Health Protection Surveillance Centre [Internet]. [cited 2020 Sep 6]. Available from: <https://www.hpsc.ie/a-z/respiratory/coronavirus/novelcoronavirus/guidance/infectionpreventionandcontrolguidance/ppe/useoffacemasksbythegeneralpublic/>
5. Ong JY, Bharatendu C, Goh Y, Tang JZY, Sooi KW, Tan YL, et al. Headaches Associated With Personal Protective Equipment - A Cross-Sectional Study Among Frontline Healthcare Workers During COVID-19. *Headache.* 2020;60(5):864–77.
6. Jian Hua Zhu,¹ Shu Jin Lee,² De Yun Wang,³ HeowPueh Lee¹ Effects of long duration wearing of N95 respirator and surgical facemask: a pilot study
7. Kao TW, Huang KC, Huang YL, Tsai TJ, Hsieh BS, Wu MS. The physiological impact of wearing an N95 mask during hemodialysis as a precaution against SARS in patients with end-stage renal disease. *J Formos Med Assoc* 2004;103: 624–8
8. O'Connor C, Murphy M. Going viral: doctors must tackle fake news in the covid-19 pandemic. *BMJ.* 2020 24;369:m1587.
9. Greenhalgh T. Face coverings for the public: Laying straw men to rest. *J Eval Clin Pract.* 2020;26(4):1070–7.