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Worth Investigating The Changes (If Any) In The Misnomer "Wind-Chill" Effect Of Noses Among Masked Workers, Intubated Patients and Laryngectomy Patients

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Origin Of Hypothesis

As elicited in my opinion [1] for the resourceful readers to consider researching and exploring the theorized and envisaged pathophysiological phenomena, I am sharing my thoughts on how to investigate nasopharyngeal temperatures changing among masked workers, intubated patients and laryngectomy patients to validate or refute if human noses are providing the misnomer â€œwind-chillâ€• effect [2] on to the airs they (the humans) exhale while warming what they (the humans) inhale [3] and on the brains they (the noses) cool with changes in the nasopharyngeal temperatures providing the indication that this brain-cooling and exhalation-cooling (inhalation-warming) effects of noses may be attenuated when humans wear masks, or are intubated, or have undergone laryngectomy.Â Â

Envisaged Materials and Methods

After institutional review board approval and written informed consents by subjects, adults 18 years old and above can be consented to participate in any of the three arms of the envisaged study as follows:

- Masked Workers (MW): Five male and five female healthcare workers in the perioperative areas mandatorily wearing personal protective equipment during their work-hours can be enrolled in this arm
- Intubated Patients (IP): Five male and five female ASA Physical Status Class I-II patients presenting to the preoperative areas for planned elective abdominal surgeries under general endotracheal tube anesthesia in supine position with planned intraoperative upper body forced-air warming blanketsâ€™ plastic sheets covering their heads-and-faces-and-necks can be enrolled in this arm
- Laryngectomy Patients (LP): Five male and five female non-tracheostomized laryngeal cancer patients presenting to the preoperative areas for planned elective total laryngectomy under general anesthesia with planned intraoperative lower body forced-air warming blankets complemented by surgical drapes covering their heads-and-faces superior and above the surgical fields and without the plan for concurrent tracheo-esophageal puncture/prosthesis surgery can be enrolled in this arm

During enrollment, subjects can be excluded if they (a) demonstrate unilateral or bilateral nasal air flow obstruction objectively [4], or (b) have known bleeding tendencies or coagulation disorders, or (c) are currently receiving anti-thrombotic agents or thrombolytic agents, or (d) have history of epistaxis or nasal surgery or nasal trauma or nasal deformity.Â Â

To calibrate before the experimentation, two single-use disposable temperature probes to be used in each subject can be simultaneously exposed to ambient room environment to record the differences in their baseline recordings if any so that these differences can be accounted for while recording the temperatures during the experimentation. After calibration, the first temperature probe for continuously recording nasopharyngeal temperature can be placed across one nostril at appropriate depth in upper nasopharyngeal cavity at fossa of Rosenmuller under fiberscope guidance from the contralateral nostril [5-9]. Thereafter after removing the fiberscope, the second temperature probe can be affixed freely hanging in front of that contralateral nostril to assess the ambient temperature just outside the nostril. After placing these temperature probes as described above, the subjects can be followed on an observation protocol as per the arm of the study in which they have been enrolled:

- In the MW-Arm: Healthcare workers can wear (a) nothing on their heads and faces for the initial 10-minute-observation period followed by (b) just wearing a bouffant cap on their heads covering their both ears as well for the next 10 minutes followed by (c) adding a surgical mask over their faces for the next 10 minutes followed by (d) replacing the surgical mask with a N95 respirator over their faces for the next 10 minutes followed by (e) adding the surgical mask over the N95 respirator covering their faces for the next 10 minutes followed by (f) adding a face-shield covering the faces dually masked with the surgical mask over the N95 respirator for the next 10 minutes followed by (g) finally removing all

the personal protective equipment (face-shield, surgical mask, N95 respirator and bouffant cap) for the final 10-minute-obseravation period

- In the IP-Arm: After having placed the two temperature probes prior to any pre-medication for anesthesia, the patients can be observed for (a) the initial 10-minute-observation period before the induction of anesthesia followed by (b) the intermediate 50-minute-observation period beginning at the induction of anesthesia followed by a no-observation period during the variably timed discontinuous period from the end of intermediate 50-minute-observation period to the time point when the stabilized extubated and spontaneously breathing patients reach the post-anesthesia care unit areas wherein they can be (c) finally observed for the final 10-minute-observation period
- In the LP-Arm [10]: After having placed the two temperature probes prior to any pre-medication for anesthesia, the patients can be observed for (a) the initial 10-minute-observation period before the induction of anesthesia followed by (b) the intermediate 50-minute-observation period beginning at the induction of anesthesia followed by a no-observation period during the variably timed discontinuous period from the end of intermediate 50-minute-observation period to the time point when the stabilized post-laryngectomy patients spontaneously breathing across their tracheal stomas/tubes reach the post-anesthesia care unit areas wherein they can be (c) finally observed for the final 10-minute-observation period

The total recorded and analyzed periods for all subjectsâ€™ two temperatures can be 70 minutes. The two temperature probes can thereafter be removed from the subjects.

Expected Line Of Results

It is my expectation that secondary to head-and-face covering personal protective equipment among the MW-Arm subjects, and/or head-and-face-and-neck covering upper body forced-air warming blanketsâ€™ plastic sheets among the IP-Arm subjects, and/or head-and-face covering surgical drapes among the LP-Arm subjects, nasopharyngeal temperatures as recorded by the first temperature probes in the fossa of Rosenmuller may rise to come closer to the core body temperatures of 37 degrees Celsius or may even rise along with the core body temperatures above and beyond 37 degrees Celsius. These increases in nasopharyngeal temperatures may be noted to change in correlation to the changes in the ambient temperatures under the personal protective equipment and/or plastic sheets and/or surgical drapes as recorded by the second temperature probes just outside the nostrils. As compared to the baseline initial 10-minute-observation period, these induced increments in nasopharyngeal temperatures during the intermediate 50-minute-observation period may only return down to lower baseline levels in the final 10-minute-observation period after personal protective equipment have been removed by masked workers (MW-Arm subjects) and after extubated patients (IP-Arm subjects) are breathing spontaneously in post anesthesia care units but not among laryngectomy patients (LP-Arm subjects) who have to spontaneously breath only across tracheal stomas/tubes in post anesthesia care units with no air flowing across their noses. This may also provide the evidence to the fact that nasopharyngeal temperature truly denoting the local nasopharyngeal environmentâ€™s temperature first and then extrapolating to the distant brain temperature next may be affected by the nasopharyngeal environmentâ€™s variable exposure to variably warmed air flow under the personal protective equipment and/or plastic sheets and/or surgical drapes in addition to the changes secondary to the thermoregulatory effects of anesthesia itself because the appropriately placed nasopharyngeal temperature probe in the fossa of Rosenmuller closer to the internal carotid artery may match the core body temperature as adjudged by appropriately placed esophageal temperature probe immediately posterior to the heart and away from breathing lung tissues only when there is no â€œwind-chillingâ€• air flow within and around the nasopharynx [11-16]. Â

Conclusion

It is worth investigating if the personal protective equipment and/or plastic sheets and/or surgical drapes can induce ambient temperaturesâ€™ changes for the human noses and if these changes can affect human nasopharyngeal environmentsâ€™ temperatures thus correspondingly inducing or reflecting changes in human brain temperatures under the personal protective equipment, plastic sheets and surgical drapes among masked workers, intubated patients and laryngectomy patients respectively.Â

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