Relationshiop Between Occupants' Behaviour And Indoor Air Quality In Malaysian Public Hospital Outpatient Department

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Abstract : Introduction: Indoor air quality (IAQ) has recently gained substantial traction as the airborne transmission of infectious respiratory disease has become an increasing public health concern. Public hospital outpatient department (OPD). IAQ warrants special consideration as it is the most visited department in which patients and staff are all directly impacted by poor IAQ. However, there is limited evidence on IAQ in these settings. Moreover, occupants' behavior like occupant's movement and operation of door, windows and appliances, have been shown to significantly affect IAQ, yet the influence of these determinants on IAQ in such settings have not been established. Objectives: This study aims to examine IAQ in Malaysian public hospitals OPD and assess its relationships with occupants' behavior. Methodology: A multicenter cross-sectional study in which stratified random sampling of Johor public hospitals OPD (n=6) according to building age was conducted. IAQ measurements include indoor air temperature, relative humidity (RH), air velocity (AV), carbon dioxide (CO2), total bacterial count (TBC) and total fungal count (TFC). Occupants' behaviors in Malaysian public hospital OPD are assessed using observation forms, and results were analyzed. Descriptive statistics were performed to characterize all study variables, whereas non-parametric Spearman Rank correlation analysis was used to assess the correlation between IAQ and occupants' behavior. Results: After adjusting for potential cofounder, the study has suggested that occupants' movement in new building, like seated quietly, is significantly correlated with AV in new building (r 0.642, p-value 0.010), CO2 in new (r 0.772, p-value <0.001) and old building (r -0.559, p-value 0.020), TBC in new (r 0.747, p-value 0.001) and old building (r -0.559, p-value 0.020), and TFC in new (r 0.777, p-value < 0.001) and old building (r -0.485, p-value 0.049). In addition, standing relaxed movement is correlated with indoor air temperature (r 0.823, p-value <0.001) in new building, CO2 (r 0.559, p-value 0.020), TBC (r 0.559, p-value 0.020), and TFC (r -0.485, p-value 0.049) in old building, while walking is correlated with AV in new building (r -0.642, p-value 0.001), CO2 in new (r -0.772, p-value <0.001) and old building (r 0.559, p-value 0.020), TBC in new (r -0.747, p-value 0.001) and old building (r 0.559, p-value 0.020), and TFC in old building (r -0.485, p-value 0.049). The indoor air temperature is significantly correlated with number of doors kept opened (r 0.522, p-value 0.046), frequency of door adjustments (r 0.753, p-value 0.001), number of windows kept opened (r 0.522, p-value 0.046), number of air-conditioned (AC) switched on (r 0.698, p-value 0.004) and frequency of AC adjustment (r 0.753, p-value 0.001) in new hospital OPD building. AV is found to be significantly correlated with number of doors kept opened (r 0.642, p-value 0.01), frequency of door adjustments (r 0.553, p-value 0.032), number of windows kept opened (r 0.642, p-value 0.01), and frequency of AC adjustment, number of fans switched on, and frequency of fans adjustment(all with r 0.553, p-value 0.032) in new building. In old hospital OPD building, the number of doors kept opened is significantly correlated with CO₂, TBC (both r -0.559, p-value 0.020) and TFC (r -0.495, p-value 0.049), frequency of door adjustment is significantly correlated with CO₂, TBC (both r-0.559, p-value 0.020) and TFC (r -0.495, p-value 0.049), number of windows kept opened is significantly correlated with CO₂, TBC (both r 0.559, p-value 0.020) and TFC (r 0.495, p-value 0.049), frequency of window adjustment is significantly correlated with CO₂,TBC (both r -0.559, p-value 0.020) and TFC (r -0.495, p-value 0.049), number of AC switched on is significantly correlated with CO₂, TBC (both r -0.559, p-value 0.020) and TFC (r -0.495, p-value 0.049),, frequency of AC adjustment is significantly correlated with CO2 (r 0.559, p-value 0.020), TBC (0.559, p-value 0.020) and TFC (r -0.495, p-value 0.049), number of fans switched on is significantly correlated with CO2, TBC (both r 0.559, p-value 0.020) and TFC (r 0.495, p-value 0.049), and frequency of fans adjustment is significantly correlated with CO2, TBC (both r -0.559, p-value 0.020) and TFC (r -0.495, p-value 0.049). Conclusion: This study provided evidence on IAQ parameters in Malaysian public hospitals OPD and significant factors that may be effective targets of prospective intervention, thus enabling stakeholders to develop appropriate policies and programs to mitigate IAQ issues in Malaysian public hospitals OPD.

Keywords : outpatient department, iaq, occupants practice, public hospital

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