

ASSESSMENT OF INDOOR AIR QUALITY AND PARTICLE SIZE DISTRIBUTION OF TOTAL BACTERIA AND *STAPHYLOCOCCUS* SPP IN AN URBAN HOSPITAL IN THAILAND

Natnicha Onklay, Teerawat Junsuwun, Nontiya Homkham, Arroon Ketsakorn, Suppanut Netmaneethipsiri, Supat Wangwongwatana and Kanjana Changkaew

Faculty of Public Health, Thammasat University, Pathum Thani Province, Thailand

Abstract. Indoor air quality (IAQ) and particle size distribution of total bacteria and *Staphylococcus* spp in an urban hospital, Thailand were conducted in five outpatient departments using an Andersen six-stage impactor, together with measurements of indoor temperature, relative humidity and carbon dioxide level. Total airborne bacteria and *Staphylococcus* spp concentration ranged 75-2,261 and 12-292 CFU/m³, respectively, with *S. aureus* concentration in the range 0-7.1 CFU/m³. Mean airborne bacterial concentrations at four sampling locations (738±867, 533±372, 689±528 and 551±474 CFU/m³ for locations A, B, C and D, respectively) were all above the acceptable standard of 500 CFU/m³. In contrast, the mean airborne bacterial concentrations at location E (391±313 CFU/m³) did not exceed the acceptable standard. There was no association between bacterial concentration and physical parameters measured, but it was noted mean CO₂ level at almost all of the sampling locations was above acceptable standard (1,000 ppm). The particle size distribution demonstrates that 75% of total bacteria and 55% of *Staphylococcus* spp was in the size range (aerodynamic diameters below 4.7 µm) capable of being deposited in the lower respiratory tract. High airborne bacterial concentration and CO₂ level were indicative of poor ventilation, overcrowding and unsanitary IAQ. Presence of respiratory system microorganisms poses high risks infection of vulnerable patients. These findings highlight the urgent need to rectify this situation and to implement policies for improving and maintaining proper indoor air quality in the studied locations. This type of survey should be carried out on a regular basis in all hospitals across the country.

Keywords: *Staphylococcus aureus*, bacteria, bioaerosol, hospital, indoor air quality, outpatient department, particle size distribution

Correspondence: Kanjana Changkaew, Faculty of Public Health, Thammasat University, 99 Moo 18, Phahon Yothin Road, Klong Luang, Pathum Thani 12120, Thailand.
Tel: +66 (0) 2564 4440-9, +66 (09) 2323 6545
E-mail: kanjana.c@fph.tu.ac.th