# Microbial Air Quality and Standard Precaution Practice in a Hospital Dental Clinic

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***Objective:*** *A cross-sectional study was carried out to assess standard precaution practices among dental personnel and to investigate microbial counts in indoor air samples collected from a hospital dental clinic before and during dental works.*

***Material and Method:*** *Thirty dental personnel who voluntarily participated were interviewed using a questionnaire towards demographic information and standard precaution practices between May and August 2007. Additionally, 138 indoor air samples (72 from dental treatment units, 48 from dental supporting units and offices and 18 from patient waiting area) were collected before and during dental works for 6 days (Monday to Saturday) to investigate bacterial and fungal counts. Data were analyzed by using descriptive statistics. Paired t-test was used for analyzing the difference of mean ± standard deviation between microbial counts before and during dental procedures. The statistical significance was expressed in term of p-value and the critical level was set at $\alpha = 0.05$.*

***Results:*** *The results revealed that standard precaution practices towards wearing personal protective equipments regularly during dental procedures ranged from 50% to 100%, whereas, cleaning and disinfecting dental unit after each patient treatment and cleaning dental unit water lines with antiseptics every week were done regularly only 36.7%. The mean score of standard precaution was 8.4 ± 2.5 (moderate level, total score of 13). The means of bacterial and fungal counts in air samples collected from dental treatment units significantly increased during dental procedures when compared with those collected before dental works ($p < 0.001$), whereas, those were not significantly different in the dental supporting units and offices, $p > 0.05$.*

***Conclusion:*** *This study demonstrated the moderate level of standard precaution practice score among studied dental personnel and significantly higher microbial counts (bacterial and fungal counts) in air samples collected from dental treatment units during dental procedures were demonstrated. To reduce the occupational risk among this group, standard precaution practices should be strengthened.*

***Keywords:*** *Dental clinic, Standard precaution practice, Microbial counts, Indoor air quality*

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Infectious aerosols in hospital are an important consideration for infection control to protect patients and hospital personnel(1,2). Aerosols are defined as suspensions of liquid and/or solid particles in the air generated by coughing, sneezing, or any other acts that expel oral fluids into the air(3,4). Infectious agents in aerosols may be transmitted via droplet nuclei, airborne and contaminated surfaces of instruments(3). Dental clinics are at risk of airborne and droplet infections for patients and dental personnel, because many dental procedures can make dental aerosols and bioaerosols spread into the environment(4,5). High-speed dental drills and the ultrasonic scalers, can generate numerous aerosols derived from blood, saliva, tooth debris, dental plaque, and calculi. Most dental aerosol droplets have a diameter of 5 μm or less

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and are concentrated within 2 ft of the patient's mouth[5]. Microbial agents in aerosols may be survived in the air and may penetrate into the respiratory tract and directly invade the alveoli of the lungs. These infectious agents can cause respiratory infection and hypersensitivity disease, as well as, skin and eye infections[2,4,5]. Additionally, some airborne bacteria and fungi may affect health including headaches, eye irritation, skin irritation, respiratory difficulty, runny nose, sneezing, sinusitis, dry throat, dyspnea, and fatigue[6,7]. People are important sources of airborne microbial agents. They can carry contaminants on their clothes, nasal passages and skin which may become airborne[7,8]. Several factors, including humidity, temperature, particle size, and ventilation, could influence the load, the spread and the infectious potential of microbial aerosols[6].

Standard precaution is used for protecting health care personnel and patients from pathogens that can be spread by blood, body fluid and secretion transmitted through airborne, droplet or contact transmission[9,10]. In dental clinics, dentists who anticipate or contact with microbial aerosols or body fluids, must use full personal protective equipments (PPE, such as, protective eyewear, masks, gowns and gloves) to protect the skin, eyes, nose, and mouth from exposure to blood or oral particles[3,4]. Additionally, preventive practices used to reduce microbial aerosols or particles spattering from the oral cavity include the use of rubber dam, high power suction, dental unit water quality, antimicrobial mouth rinses used by patients before a dental procedure and hand hygiene[2,11]. The study of standard precaution practices and the quantity of microbial aerosols in a hospital dental clinic was investigated to create a risk reduction plan for safe and healthy dental clinic environments.

## Material and Method

### *Study design and study samples*

Between May and August 2007, a cross-sectional study was conducted to assess the standard precaution practices among 30 dental personnel of a hospital dental department in Bangkok. All studied personnel, who voluntarily participated, were interviewed using a structured questionnaire about general information and standard precaution practices. The standard precaution practices followed by Centers for Disease Control and Prevention (2003)[9] consisted of 13 questions (total score = 13). If studied personnel practiced regularly, the score of standard precaution in that item was equal to 1. If they practiced occasionally or never, the score was equal to 0. In addition, the indoor air samples were collected 2 times per day for 6 days (Monday to Saturday) to assess total bacteria and fungi, before and during dental procedures. These air samples were collected from 5 dental treatment units, 7 dental supporting units and offices and 1 patient waiting area. The outdoor air samples were collected at the same time of indoor air sample collection used for comparison.

### *Air samples and methods of collection*

Totally, 138 indoor air samples were collected from the studied dental department (72 samples from dental treatment units, 48 from dental supporting units and offices, and 18 from the patient waiting area), before and during dental works for 6 days (Monday to Saturday) using Millipore Air Tester (Table 1). Millipore Air Tester system is based on the Anderson principle and uses a sieve with about 1,000 micro-perforations, which reduces the potential for overlapping colonies and minimizes the desiccation of the medium. The tester is small enough to be used in confined spaces, but powerful enough to sample up to 1000 liters in just 7 minutes. This is a lightweight, portable system for testing the microbial air quality. In this study, air volume was collected for 250 liters. Plate agar count method was used to estimate bacterial or fungal counts. General bacteria were cultured in Plate count agar and general fungi were cultured in Sabouraud 4% dextrose agar. Specimens for bacteria were incubated at 37°C for 48 hrs and those for fungi were incubated at room temperature for 5 days with daily observation. After incubation, the bacterial and fungal colonies were counted and calculated to express as colony forming unit/m$^3$ (cfu/m$^3$) by the following formula:

Total counts (colony forming unit/m$^3$ or cfu/m$^3$) = [Total colonies X 1000]/250

### *Data analysis*

Data were analyzed by computer program. Descriptive statistics including percentage, mean and standard deviation were used for describing the general characteristics, standard precaution practices, and the microbial counts (bacterial and fungal counts). Paired t-test was used for analyzing the difference of mean $\pm$ standard deviation between microbial counts before and during dental procedures. The statistical significance was expressed in terms of p-value and the critical level was set at $\alpha = 0.05$.

**Table 1.** The sampling points and number of air samples of a studied hospital dental clinic

| Sampling points | Area ($m^3$) | No. of dental treatment units | No. of air samples/time/day | Total air samples/time/ 6-day collection |
|---|---|---|---|---|
| Dental treatment units | | | 12 | 72 |
| Dental surgery | 144 | 6 | 3 | 18 |
| Multi-unit | 486 | 12 | 5 | 30 |
| Orthodontic | 144 | 3 | 2 | 12 |
| Prosthetics | 54 | 2 | 1 | 6 |
| Pedodontic | 36 | 1 | 1 | 6 |
| Dental supporting units and offices | | | 8 | 48 |
| Dental lab | 108 | - | 1 | 6 |
| Screening room | 36 | - | 1 | 6 |
| Supply | 72 | - | 1 | 6 |
| X-ray | 72 | - | 1 | 6 |
| Offices (3 offices) | 288 | - | 4 | 24 |
| Patient waiting area | | | 3 | 18 |
| Outdoor (out-side the building) | | | 3 | 18 |

***Ethical approval***

This study protocol was approved by the Ethics Committee of Mahidol University (Ref. No. MU 2007-011).

**Results**

***General characteristics of studied dental personnel***

Of 30 studied dental personnel, 60% were 41-60 years of age and 86.7% were female. Approximately 56.7% finished Bachelor degree or higher. Half of them were dental nurses and dental assistants, and 40% were dentists. Most personnel (66.7%) have worked more than 10 years. Details are presented in Table 2.

***Standard precaution practices among studied dental personnel***

The standard precaution practices among studied dental personnel towards wearing personal protective barriers regularly during dental procedures ranged from 50% to 100%. For example, 100% used surgical masks and gloves, 83.3% wore protective clothes and 50% wore eye protection or face shield during procedures that generate splashing. Whereas, cleaning and disinfecting dental unit after each patient treatment and cleaning dental unit water lines with antiseptics every week were done regularly only 36.7%. The mean of standard precaution practice scores was $8.4 \pm 2.5$ (total score = 13), this was classified as a moderate level (Table 3).

**Table 2.** General characteristics of studied dental personnel in a studied dental department (n = 30)

| General characteristics | Number | Percentage |
|---|---|---|
| Age group (years) | | |
| 20-40 | 12 | 40.0 |
| 41-60 | 18 | 60.0 |
| Gender | | |
| Male | 4 | 13.3 |
| Female | 26 | 86.7 |
| Educational level | | |
| High school and Diploma | 13 | 43.3 |
| Bachelor degree | 15 | 50.0 |
| Master degree | 2 | 6.7 |
| Work position | | |
| Dentists | 12 | 40.0 |
| Dental nurses and dental assistants | 15 | 50.0 |
| Officers | 3 | 10.0 |
| Duration of work (years) | | |
| 1-10 | 10 | 33.3 |
| 11-20 | 9 | 30.0 |
| > 20 | 11 | 36.7 |

***Microbial counts in indoor air samples collected from the studied dental department***

A total of 138 indoor air samples per each collection time (before and during dental procedures for 6 days) included 72 samples from dental treatment units, 48 from dental supporting units and offices, and 18 from the patient waiting area. Eighteen outdoor air

**Table 3.** Percentage of standard precaution practices for preventing occupational infections among dental personnel (n = 30)

| Standard precaution practices for preventing occupational infections | No. (%) of personnel who practiced regularly |
|---|---|
| 1. Clinical examination before dental treatment | 16 (53.3) |
| 2. Antiseptic hand-washing before and after treating each patient | 18 (60.0) |
| 3. Wearing surgical mask to protect nose and mouth during procedures | 30 (100) |
| 4. Wearing protective clothes during procedures | 25 (83.3) |
| 5. Wearing glove during dental procedures | 30 (100) |
| 6. Wearing eyes protection or face shield during procedures that generate splashing | 15 (50) |
| 7. Removing all protective equipment before leave patient care area | 17 (56.7) |
| 8. Using high power suction during tooth filling procedures that likely generate splashing | 13 (43.3) |
| 9. Using high power suction during surgical extraction of teeth that likely generates splashing | 27 (90.0) |
| 10. Using high power suction during scaling with ultrasonic scalers | 30 (100) |
| 11. Discharging water and air from handpieces, ultrasonic scalers for 20-30 seconds after using in each patient | 9 (30.0) |
| 12. Cleaning and disinfecting dental unit after treating each patient | 11 (36.7) |
| 13. Cleaning dental unit water lines with antiseptics every week | 11 (36.7) |

Mean score $\pm$ SD = 8.4 $\pm$ 2.5 (total score = 13)

samples were collected at the same time and used for comparison. The results showed that, during dental works, the mean of bacterial counts in dental treatment units were significantly higher than that before dental works, $p < 0.001$ (118.9 $\pm$ 72.4 cfu/$m^3$ vs. 81.8 $\pm$ 56.6 cfu/$m^3$) as shown in Table 4. The mean of fungal counts in dental treatment units collected during dental works showed significantly higher than that before dental works, $p < 0.001$ (64.9 $\pm$ 8.0 cfu/$m^3$ vs. 55.2 $\pm$ 9.0 cfu/$m^3$) as shown in Table 5. Both bacterial counts and fungal counts collected from dental supporting units and offices were not significantly different between during dental works and before dental works, $p > 0.05$ (85 $\pm$ 54.7 cfu/$m^3$ vs. 82.3 $\pm$ 48.1 cfu/$m^3$ for bacterial count and 61.7 $\pm$ 6.4 cfu/$m^3$ vs. 58.3 $\pm$ 10.4 cfu/$m^3$ for fungal counts). Additionally, the means of bacterial counts and fungal counts in air samples collected from the patient waiting area during dental procedures were significantly higher than those before dental procedures, $p < 0.001$ (354.1 $\pm$ 178.6 cfu/$m^3$ vs. 298 $\pm$ 127.9 cfu/$m^3$ for bacterial count and 69. $\pm$ 11.6 cfu/$m^3$ vs. 63.8 $\pm$ 10.4 cfu/$m^3$ for fungal count). Most isolated bacterial colonies were *Staphylococcus* spp. and most isolated fungal colonies were *Aspergillus* spp. and *Penicillium* spp.

## Discussion

This short-term assessment study of microbial counts in indoor air samples collected from a hospital dental clinic in Bangkok was to compare microbial air quality between before and during dental procedures. The study showed that the means of bacterial and fungal counts in air samples collected from the dental treatment units during dental procedures significantly increased when compared with those before dental procedures, $p < 0.001$. Whereas, those in the dental supporting units and offices were not significantly different, $p > 0.05$. This might be related to bioaerosols produced from dental procedures[4,5,12,13]. Grenier A (1995) demonstrated higher bacterial counts during 2 different dental treatments, 216 $\pm$ 75 cfu/$m^3$ for ultrasonic scaling treatment and 75 $\pm$ 22 cfu/$m^3$ for operative treatment[14]. Maghlouth A, et al (2004) found that the concentration of total bacterial aerosols was higher in multi-chair unit, sterilization center and prosthesis laboratory during working sessions when compared with before working sessions[15]. In addition, this study found that bacterial counts and fungal counts in air samples collected from the patient waiting area during dental works were significantly higher than those before dental works, $p < 0.001$. This might be due to the increase of people in the closed area[7,8]. People are sources of bacteria, such as *Staphylococcus* spp., *Streptococcus* spp., and others. They can also carry contaminants on their clothes, nasal passages, and skin, which become airborne[16].

When the microbial contamination was identified the group or genus, it was found that the predominant group of isolated bacteria in the present study was *Staphylococcus* spp. and the predominant

**Table 4.** Mean ± standard deviation of bacterial counts (cfu/m$^3$) in air samples collected from the studied dental clinic (n = number of samples in each collection time)

| Day/period | Dental treatment units | Supporting units and offices | Patient waiting area | Outdoor |
|---|---|---|---|---|
| Monday | n = 12 | n = 8 | n = 3 | n = 3 |
| Before | 83 ± 34.8 | 88 ± 51.5 | 316 ± 48.5 | 396 ± 255 |
| During | 125.2 ± 65 | 90 ± 47.9 | 464 ± 143.2 | 332 ± 213 |
| Tuesday | n = 12 | n = 8 | n = 3 | n = 3 |
| Before | 86 ± 53.7 | 83 ± 27.1 | 372 ± 60.4 | 320 ± 243.7 |
| During | 115 ± 100 | 85 ± 62.9 | 416 ± 254 | 284 ± 176.8 |
| Wednesday | n = 12 | n = 8 | n = 3 | n = 3 |
| Before | 75 ± 24 | 81 ± 67.6 | 340 ± 102 | 276 ± 140.6 |
| During | 118 ± 75.5 | 89 ± 70.8 | 388 ± 31.7 | 340 ± 66 |
| Thursday | n = 12 | n = 8 | n = 3 | n = 3 |
| Before | 66 ± 10.2 | 79 ± 27.2 | 268 ± 42.1 | 236 ± 96.2 |
| During | 105 ± 50.8 | 89 ± 31.2 | 288 ± 66.8 | 240 ± 91.6 |
| Friday | n = 12 | n = 8 | n = 3 | n = 3 |
| Before | 69 ± 2.6 | 82 ± 48.3 | 260 ± 42.1 | 232 ± 135.2 |
| During | 103 ± 63.8 | 79 ± 65.8 | 336 ± 184.7 | 276 ± 205 |
| Saturday | n = 12 | n = 8 | n = 3 | n = 3 |
| Before | 112 ± 96 | 76 ± 48.8 | 236 ± 60.4 | 228 ± 77.1 |
| During | 147 ± 80.6 | 80 ± 49.6 | 232 ± 66.6 | 244 ± 84 |
| Total | n = 72 | n = 48 | n = 18 | n = 18 |
| Before | 81.8 ± 56.6* | 82.3 ± 48.1 | 298 ± 127.9* | 281.3 ± 180.5 |
| During | 118.9 ± 72.4* | 85 ± 54.7 | 354.1 ± 178.6* | 289 ± 148.1 |

* Significant difference by paired t-test, $p < 0.001$
Most isolated bacteria were *Staphylococcus* spp.

**Table 5.** Mean ± standard deviation of fungal counts (cfu/m$^3$) in air samples collected from the studied dental clinic (n = number of samples in each collection time)

| Day/period | Dental treatment units | Supporting units and offices | Patient waiting area | Outdoor |
|---|---|---|---|---|
| Monday | n = 12 | n = 8 | n = 3 | n = 3 |
| Before | 59 ± 3.5 | 57 ± 8.9 | 67.3 ± 6.4 | 116 ± 30.2 |
| During | 67 ± 5.6 | 59.4 ± 7.2 | 67.2 ± 8.3 | 125.6 ± 23.1 |
| Tuesday | n = 12 | n = 8 | n = 3 | n = 3 |
| Before | 55 ± 15.7 | 58.5 ± 13.9 | 76 ± 6.9 | 204 ± 36 |
| During | 63.6 ± 11.4 | 63 ± 7.8 | 76.8 ± 22 | 187.2 ± 52 |
| Wednesday | n = 12 | n = 8 | n = 3 | n = 3 |
| Before | 51 ± 7.4 | 59 ± 6.1 | 60 ± 12 | 104 ± 45.4 |
| During | 60 ± 5.6 | 60.1 ± 5.2 | 62.8 ± 8.3 | 105.6 ± 22 |
| Thursday | n = 12 | n = 8 | n = 3 | n = 3 |
| Before | 54 ± 8 | 58.5 ± 14.2 | 64 ± 18.3 | 132 ± 24 |
| During | 69.6 ± 9.6 | 66.6 ± 8.3 | 72 ± 14.4 | 134 ± 8.3 |
| Friday | n = 12 | n = 8 | n = 3 | n = 3 |
| Before | 57 ± 4.7 | 61.5 ± 10.8 | 60 ± 12.1 | 100 ± 18.3 |
| During | 67 ± 1.5 | 63 ± 7.8 | 62.8 ± 8.3 | 115.2 ± 14.4 |
| Saturday | n = 12 | n = 8 | n = 3 | n = 3 |
| Before | 55 ± 9.5 | 55.5 ± 9.2 | 62 ± 6.9 | 128 ± 18.3 |
| During | 63.6 ± 9.6 | 58 ± 0.9 | 77.8 ± 8.3 | 120 ± 22 |
| Total | n = 72 | n = 48 | n = 18 | n = 18 |
| Before | 55.2 ± 9.0* | 58.3 ± 10.4 | 63.8 ± 10.4* | 130.7 ± 43.9 |
| During | 64.9 ± 8.0* | 61.7 ± 6.4 | 69 ± 11.6* | 131.3 ± 35.6 |

* Significant difference by paired t-test, $p < 0.001$
Most isolated fungi were *Penicillium* spp. and *Aspergillus* spp.

groups of isolated fungi were *Aspergillus* spp. and *Penicillium* spp. These airborne bacteria and fungi may affect human health including allergic reactions and respiratory infections[6,7,17,18]. However, most *Staphylococcus* spp. found in air environments is *S. epidermidis* which is the normal flora of the human skin and respiratory tract[16]. The study of Maghlouth A, et al (2004) found that *S. epidermidis* was the highest prevalence of bacteria found in dental clinics[15]. Szymanska J (2006) reported that the main group of fungal species isolated from air samples collected during dental treatment with high-speed handpiece was *Penicillium* spp[19].

The indoor air samples in this study were collected for 6 days (Monday to Saturday). It was found that the mean of bacterial counts was relatively higher on the end of the week (Saturday). This might be related to bacterial aerosol accumulation in dental clinic environments and ventilation systems. However, fungal counts were relatively consistent on the 6 studied days. The American Conference of Governmental Industrial Hygienists (ACGIH) Committee suggested that total bacterial or fungal levels in excess of 500 cfu/$m^3$ in an office workplace were indication of poor ventilation, overcrowding and in need of remedial actions[20]. For individuals with immunosuppression, the microbial count should be less than 100 cfu/$m^3$, and it should be less than 300 cfu/$m^3$ for general offices[8,21]. There were no air samples collected from dental treatment units and supporting units and offices that had a high bacterial or fungal count from this study. More than 90% of air samples had bacterial count less than 300 cfu/$m^3$ and 100% had fungal count less than 500 cfu/$m^3$ which meet the ACGIH suggestion.

Exposures to microbial aerosols were associated with a wide range of adverse health effects including respiratory infections, allergies and others[3,4,6,7]. Health care facilities including dental clinics should be especially aware of exposure of patients to airborne microbial agents. Standard precaution practices should be emphasized. This study showed that 100% of studied dental personnel wore surgical masks and gloves during dental procedures. Whereas, only 50% wore eye protection or face shield during procedures that generated splashing. A previous study showed 63% of dentists wore eye protection, 80% wore surgical masks and 87% wore gloves during dental treatment on a routine basis[22]. Recent studies showed low percentage of dental personnel wore personal protective barriers[23,24]. In an African study, about 52% and 65% wore gloves and surgical masks during a dental procedure and only 8.7% and 21.7% changed gloves and masks after each patient treatment, respectively[23]. In Jordan, a study in dental laboratories demonstrated that 16-24% of dental technicians wore gloves during working and 35% regularly wore eyeglasses and protective face shields[24]. Additionally, this study demonstrated that 36.7% regularly cleaned dental unit water lines with anti-septic every week and 30% regularly discharged water and air from handpieces, ultrasonic scalers for 20-30 seconds after using in each patient. The quality of dental unit water is important because patients and dental personnel are regularly exposed to water and aerosols generated from the unit. The contamination of dental unit water lines might be due to the rapid formation of biofilms[11]. Flushing the water lines for 2 minutes at the start of the day and for 20-30 seconds between patients will remove the biofilms[11].

In conclusion, this study demonstrated the moderate level of standard precaution practice score among studied dental personnel and microbial counts (bacterial and fungal counts) in air samples collected from dental treatment units significantly increased during dental procedures. To reduce the occupational risk among this group, standard precaution practices should be strengthened.

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## *คุณภาพอากาศทางจุลินทรีย์และการปฏิบัติตามมาตรฐานการป้องกันการติดเชื้อในคลินิกทันตกรรม โรงพยาบาลแห่งหนึ่ง*

***พิพัฒน์ ลักษมีจรัลกุล, นวพรรณ ปัญญา, ดุสิต สุจิรารัตน์, สร้อยศิริ ทวีบูรณ์***

***วัตถุประสงค์:*** *การศึกษาภาคตัดขวางเพื่อประเมินการปฏิบัติตามมาตรฐานการป้องกันการติดเชื้อของทันตบุคลากร และประเมินปริมาณเชื้อจุลินทรีย์ในตัวอย่างอากาศภายในคลินิกก่อนและขณะให้บริการทันตกรรม*

***วัสดุและวิธีการ:*** *ศึกษาในทันตบุคลากรที่สมัครใจจำนวน 30 ราย โดยใช้แบบสอบถามประกอบการสัมภาษณ์เกี่ยวกับข้อมูลส่วนบุคคลทางสังคมและการปฏิบัติตามมาตรฐานการป้องกันการติดเชื้อ พร้อมเก็บตัวอย่างอากาศภายในคลินิก 138 ตัวอย่าง (72 ตัวอย่างจากหน่วยรักษาทันตกรรม, 48 ตัวอย่างจากหน่วยสนับสนุนและสำนักงาน, และ 18 ตัวอย่างจากบริเวณผู้ป่วยนั่งรอรับบริการ) เก็บตัวอย่าง 2 ช่วง คือ ก่อนเปิดบริการและขณะให้บริการทันตกรรม เก็บติดต่อกัน 6 วัน (วันจันทร์ถึงวันเสาร์) เพื่อตรวจหาปริมาณเชื้อแบคทีเรียและเชื้อรา วิเคราะห์ข้อมูลโดยใช้สถิติเชิงพรรณนา และใช้ paired-t test วิเคราะห์ความแตกต่างของค่าเฉลี่ยปริมาณจุลินทรีย์ก่อนและขณะให้บริการทันตกรรม*

***ผลการศึกษา:*** *พบว่าทันตบุคลากรมีการปฏิบัติตามมาตรฐานการป้องกันการติดเชื้อในระดับปานกลางด้วยคะแนนเฉลี่ย $8.4 \pm 2.5$ จาก 13 คะแนน โดยการปฏิบัติด้านการใช้อุปกรณ์ป้องกันตนเองสม่ำเสมอ ร้อยละ 50 ถึง ร้อยละ 100 ในขณะที่การปฏิบัติด้านการทำความสะอาดและทำลายเชื้อหลังการให้การรักษาผู้ป่วยแต่ละราย และการล้างอุปกรณ์ฉีดน้ำด้วยน้ำยาฆ่าเชื้อทุกสัปดาห์ ร้อยละ 36.7 ผลการตรวจคุณภาพอากาศ พบว่า ปริมาณเชื้อแบคทีเรียและเชื้อราเฉลี่ยในหน่วยรักษาทันตกรรมเพิ่มขึ้นขณะปฏิบัติการรักษาอย่างมีนัยสำคัญทางสถิติ ($p < 0.001$) เมื่อเทียบกับปริมาณเชื้อก่อนให้บริการสำหรับในหน่วยสนับสนุนและสำนักงาน ปริมาณเชื้อแบคทีเรียและเชื้อราเฉลี่ยก่อนเปิดบริการและขณะให้บริการไม่มีความแตกต่างกันอย่างมีนัยสำคัญทางสถิติ ($p > 0.05$)*

***สรุป:*** *การศึกษานี้พบว่า ทันตบุคลากรมีการปฏิบัติตามมาตรฐานการป้องกันการติดเชื้อในระดับปานกลาง ปริมาณเชื้อแบคทีเรียและเชื้อราเฉลี่ยในหน่วยรักษาทันตกรรมเพิ่มขึ้นขณะปฏิบัติการรักษาทางทันตกรรมอย่างมีนัยสำคัญทางสถิติ ดังนั้นเพื่อเป็นการลดความเสี่ยงจากการปฏิบัติทันตกรรม ทันตบุคลากรควรปฏิบัติตามมาตรฐานการป้องกันการติดเชื้ออย่างเคร่งครัด*