

Description of Germ Count on Outpatient Ward Floors Before and After Mopping at Inche Abdoel Moeis Regional Hospital

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ABSTRACT

Background: Hospital environmental cleanliness is an important indicator in preventing Health-Care Associated Infections (HAIs). Outpatient rooms are high-traffic service areas with a high potential for floor contamination by microorganisms. This study aimed to describe the germ count on outpatient room floors before and after mopping at Inche Abdoel Moeis Regional Hospital, Samarinda.

Methods: This study used a descriptive quantitative method with a cross-sectional approach. Samples consisted of 22 floor swab specimens from 11 outpatient clinics, including samples before and after mopping. Sampling was carried out using purposive sampling. Floor swab samples were cultured on Plate Count Agar (PCA) media through serial dilutions of 10^{-1} , 10^{-2} , and 10^{-3} , then incubated at 35°C for 24–48 hours. Bacterial colonies were counted using a colony counter and calculated as Total Plate Count in CFU/cm².

Results: The average germ count before mopping was 1.15 CFU/cm² and decreased to 0.40 CFU/cm² after mopping. The highest pre-mopping value was found in sample P1 at 5.8 CFU/cm², while the highest post-mopping value was found in sample P3 at 1.3 CFU/cm². All samples both before and after mopping were still below the hospital floor sanitation quality standard of ≤ 10 CFU/cm². A total of 100% of samples met the health requirements.

Conclusion: Mopping was able to reduce the floor germ count in most outpatient rooms. Although several rooms showed slight increases after mopping, all outpatient room floors still met the sanitation standard based on the Regulation of the Minister of Health of the Republic of Indonesia Number 7 of 2019.

ABSTRAK

Latar Belakang: Kebersihan lingkungan rumah sakit merupakan indikator penting dalam pencegahan Health-Care Associated Infections (HAIs). Ruang rawat jalan merupakan area pelayanan dengan lalu lintas tinggi sehingga berpotensi mengalami kontaminasi mikroorganisme pada lantai. Penelitian ini bertujuan untuk mengetahui gambaran angka kuman pada lantai ruang rawat jalan sebelum dan sesudah pengepelan di RSUD Inche Abdoel Moeis Samarinda.

Metode: Penelitian ini menggunakan metode kuantitatif deskriptif dengan pendekatan cross-sectional. Sampel penelitian berjumlah 22 sampel usap lantai dari 11 ruangan rawat jalan. Pengambilan sampel dilakukan dengan purposive sampling. Sampel usap lantai ditanam pada media Plate Count Agar (PCA) melalui pengenceran bertingkat, kemudian diinkubasi pada suhu 35°C selama 24–48 jam. Koloni bakteri dihitung menggunakan colony counter dan dinyatakan dalam CFU/cm².

Hasil: Rata-rata angka kuman lantai sebelum pengepelan sebesar 1,15 CFU/cm² dan menurun menjadi 0,40 CFU/cm² sesudah pengepelan. Nilai tertinggi sebelum pengepelan terdapat pada sampel P1 sebesar 5,8 CFU/cm², sedangkan nilai tertinggi sesudah pengepelan terdapat pada sampel P3 sebesar 1,3 CFU/cm². Seluruh sampel baik sebelum maupun sesudah pengepelan masih berada di bawah baku mutu sanitasi lantai rumah sakit yaitu ≤ 10 CFU/cm². Sebanyak 100% sampel dinyatakan memenuhi syarat kesehatan.

Kesimpulan: Pengepelan mampu menurunkan angka kuman lantai pada sebagian besar ruang rawat jalan. Meskipun terdapat beberapa ruangan yang mengalami peningkatan setelah pengepelan, seluruh lantai ruang rawat jalan tetap memenuhi standar sanitasi berdasarkan Permenkes RI Nomor 7 Tahun 2019.

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INTRODUCTION

Hospitals are healthcare facilities that play a vital role in healing, recovery, and maintaining public health. In carrying out healthcare services, hospitals are required to provide a safe, comfortable, clean, and hygienic environment to prevent disease transmission within healthcare settings. Environmental cleanliness in hospitals is considered an important indicator of healthcare service quality, as regulated in the Regulation of the Minister of Health of the Republic of Indonesia Number 7 of 2019 concerning Hospital Environmental Health (Ministry of Health of the Republic of Indonesia, 2019).

Nosocomial infections, also known as Health-Care Associated Infections (HAIs), are infections acquired by patients during treatment in healthcare facilities and are not present at the time of admission. The high prevalence of nosocomial infections in developing countries indicates that environmental hygiene control remains a major challenge in healthcare services (World Health Organization, 2020). Hospital floors are considered potential reservoirs for microorganisms because they are continuously exposed to patients, healthcare workers, medical equipment, dust particles, and settled droplets.

Mopping is one of the routine sanitation procedures used to reduce the number of microorganisms on floor surfaces. However, the effectiveness of mopping is influenced by several factors, including the type and concentration of disinfectant, cleaning techniques, frequency of cleaning, and staff compliance with standard operating procedures (Setiawan & Kusuma, 2023). Floor cleanliness can be evaluated by measuring the germ count, which refers to the number of bacterial colonies growing on culture media obtained from floor swab samples. According to the Regulation of the Minister of Health of the Republic of Indonesia Number 7 of 2019, the acceptable germ count standard for hospital floors is ≤ 10 CFU/cm² (Ministry of Health of the Republic of Indonesia, 2019).

RSUD Inche Abdoel Moeis is a regional referral hospital with outpatient services consisting of various polyclinics that experience relatively high patient visits every day. The high mobility of patients, visitors, and healthcare workers in outpatient areas potentially increases the risk of microbial contamination on floor surfaces. Therefore, research is needed to determine the germ count on outpatient clinic floors before and after mopping in order to evaluate the effectiveness of environmental sanitation procedures in the hospital.

METHOD

Types of Research

The type of research used is analytical with *a cross sectional design*.

Research Location and Time

Hospitals are healthcare facilities that play a vital role in healing, recovery, and maintaining public health. In carrying out healthcare services, hospitals are required to provide a safe, comfortable, clean, and hygienic environment to prevent disease transmission within healthcare settings. Environmental cleanliness in hospitals is considered an important indicator of healthcare service quality, as regulated in the Regulation of the Minister of Health of the Republic of Indonesia Number 7 of 2019 concerning Hospital Environmental Health (Ministry of Health of the Republic of Indonesia, 2019).

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Population and Sample

Sampling was conducted in the outpatient ward of Inche Abdoel Moeis Regional Hospital, Samarinda. Total Plate Count examination was conducted in the Bacteriology Laboratory of the Medical Laboratory Technology Department, Health Polytechnic, East Kalimantan. The study was conducted from August to November 2025.

Data Collection

The research population is all permanent lecturers who have functional positions. This research is carried out on the entire population. The study population comprised 13 floors of outpatient wards at Inche Abdoel Moeis Regional Hospital. Purposive sampling was used based on predetermined inclusion criteria. Using the Slovin formula, 11 outpatient wards were selected as samples: Surgery, Internal Medicine, ENT, Pediatrics, Orthopedics, Obstetrics and Gynecology, Psychiatry, Dermatology and Venereology, Eye, Pulmonary, and Neurology. A total of 22 specimens were collected, consisting of 11 samples before and 11 samples after swabbing.

The variable studied was the Total Plate Count of bacteria on the floor of the outpatient room. Samples were collected using a floor swab method using sterile cotton swabs moistened with 0.9% NaCl. Swabbing was performed at five representative points: four corners and one center point on a 20 × 20 cm tile. Sampling was performed before mopping and repeated after mopping.

Data Processing and Analysis

Samples were serially diluted up to 10³ and then planted on Plate Count Agar media using the pour plate method. Incubation was carried out at 35°C for 24–48 hours. Bacterial colonies were counted using a colony counter and expressed in CFU/cm². Data were processed through editing, coding, tabulating, and cleaning stages. Data analysis was performed univariately to determine the average, frequency distribution, percentage, and difference in bacterial numbers before and after mopping.

RESEARCH RESULTS

The results of the germ count examination on outpatient room floors before and after mopping are presented in the tables below.

Table 1 Germ Count on the Floor of the Outpatient Room Before and After Mopping at Inche Abdoel Moeis Regional Hospital Based on Indonesian Minister of Health Regulation No. 7 of 2019

No	Sample Code	ALT Before (CFU/cm ²)	Information	ALT After (CFU/cm ²)	Information
1.	P1	5.8	MS	0.8	MS
2.	P2	0.8	MS	0.7	MS
3.	P3	0.4	MS	1.3	MS
4.	P4	0.1	MS	0.2	MS
5.	P5	0.3	MS	0.04	MS
6.	P6	0.3	MS	0.03	MS
7.	P7	0.4	MS	0.4	MS
8.	P8	0.8	MS	0.6	MS

No	Sample Code	ALT Before (CFU/cm ²)	Information	ALT After (CFU/cm ²)	Information
9.	P9	1.0	MS	0.1	MS
10.	P10	2.0	MS	0.2	MS
11.	P11	0.7	MS	0.02	MS
	Total ALT	12.6		4.39	
	Average ALT	1.15	MS	0.40	MS

The average Total Plate Count (TPC) of the floor before mopping was 1.15 CFU/cm², while after mopping it decreased to 0.40 CFU/cm². The highest germ count value before mopping was found in sample P1 at 5.8 CFU/cm², while the highest value after mopping was found in sample P3 at 1.3 CFU/cm². All TPC values obtained were still below the standard for hospital floor sanitation quality (≤ 10 CFU/cm²) according to the Indonesian Minister of Health Regulation Number 7 of 2019, so that all outpatient rooms were declared to meet the requirements (MS).

Table 2 Percentage of Germ Counts on the Floor of the Outpatient Room Before and After Mopping at Inche Abdoel Moeis Regional Hospital Based on the Quality Standards of Indonesian Minister of Health Regulation No. 7 of 2019

No.	Quality Standards	Before (n)	Before (%)	After (n)	After (%)
1.	Qualify	11	100	11	100
2.	Not Eligible	0	0	0	0
	Total	11	100	11	100

The results of the examination showed that 100% of the outpatient room floor samples, both before and after mopping, were included in the Meets Requirements (MS) category according to the standards of the Indonesian Minister of Health Regulation No. 7 of 2019.

Table 3 Difference in Germ Numbers on the Floor of the Outpatient Room Before and After Mopping at Inche Abdoel Moeis Regional Hospital

No	Sample Code	ALT Before (CFU/cm ²)	ALT After (CFU/cm ²)	Difference (CFU/cm ²)
1.	P1	5.8	0.8	5.0
2.	P2	0.8	0.7	0.1
3.	P3	0.4	1.3	-0.9
4.	P4	0.1	0.2	-0.1
5.	P5	0.3	0.04	0.26
6.	P6	0.3	0.03	0.27
7.	P7	0.4	0.4	0.0
8.	P8	0.8	0.6	0.2
9.	P9	1.0	0.1	0.9
10.	P10	2.0	0.2	1.8
11.	P11	0.7	0.02	0.68

The results of the examination showed the largest decrease in ALT values at P1, at 5.0 CFU/cm². However, several sample codes still found an increase in ALT values after mopping, with the highest difference at P3, at -0.9 CFU/cm².

DISCUSSION

Based on Table 4.1, the results of the Total Plate Count (TPC) examination of outpatient room floors showed that the average TPC value before mopping was 1.15 CFU/cm² and decreased to 0.40

CFU/cm² after mopping. The highest TPC value before mopping was found in sample P1 at 5.8 CFU/cm², while the highest value after mopping was found in sample P3 at 1.3 CFU/cm². Although there were differences in values between sample codes, all examination results both before and after mopping were still below the threshold for hospital floor sanitation quality standards (≤ 10 CFU/cm²) in accordance with Indonesian Minister of Health Regulation No. 7 of 2019, so all samples were declared to meet the requirements.

The highest TPC value before mopping in sample code P1 was presumably influenced by high service activity and the number of visitors, amounting to approximately 2,562 visitors over a six-month period, thereby increasing the potential for floor surface contamination. The decrease in TPC values after mopping indicates that the use of disinfectant at appropriate concentrations, correct mopping techniques, and regular cleaning frequency were able to suppress the number of microorganisms on the floor surface (Ministry of Health of the Republic of Indonesia, 2019). All samples both before and after mopping were in the meets requirements category because they were still below the threshold of ≤ 10 CFU/cm². This indicates that floor sanitation in the outpatient wards of Inche Abdoel Moeis Regional Hospital is generally well maintained, influenced by the implementation of twice-daily cleaning, the use of sodium hypochlorite as a disinfectant, and sweeping procedures prior to mopping.

Based on Table 4.2, the examination results showed that 100% of outpatient room floor samples, both before and after mopping, were in the meets requirements category and no samples were found to be ineligible. These results demonstrate that the overall condition of floor sanitation has been maintained in accordance with established standards. The achievement of floor cleanliness quality is greatly influenced by the consistency of applying standard operating procedures for cleaning, the use of appropriate disinfectant materials, and supervision of implementation in the field. Regular cleaning and disinfection of environmental surfaces is an important component in controlling microorganisms in healthcare facilities. Based on observations, cleaning staff had carried out floor cleaning in accordance with procedures, including the use of personal protective equipment, diluting disinfectant solutions to standard concentrations, cleaning frequency of twice daily, and application of the figure-eight mopping technique.

Based on Table 4.3, most sample codes showed a decrease in germ count after mopping, with the largest decrease found in sample P1 at 5.0 CFU/cm². However, some sample codes still showed an increase in TPC values after mopping, namely in samples P3 and P4. In sample P3, the TPC value increased from 0.4 CFU/cm² to 1.3 CFU/cm² with a difference of -0.9 CFU/cm², while in sample P4 there was an increase from 0.1 CFU/cm² to 0.2 CFU/cm² with a difference of -0.1 CFU/cm². Nevertheless, all TPC values before and after mopping remained in the meets requirements category in accordance with hospital floor cleanliness standards.

The effectiveness of floor mopping as a microorganism control measure is greatly influenced by the type of disinfectant and the accuracy of the solution concentration used. The WHO states that areas with high traffic have a greater risk of environmental contamination and therefore require special attention in cleaning (WHO, 2020). The mop is a medium that comes into direct contact with the floor surface and therefore plays an important role in the effectiveness of the cleaning and microorganism control process. The mopping system used in healthcare facilities is generally the double bucket system, which uses two separate buckets for the cleaning solution and rinse water. This system aims to reduce the risk of cross-contamination by preventing the reuse of cleaning solutions that have been contaminated with germs (Dancer, 2014).

CONCLUSIONS AND SUGGESTIONS

The average germ count on outpatient room floors before mopping was 1.15 CFU/cm² and after mopping was 0.40 CFU/cm². All samples were in the meets requirements category in accordance with Indonesian Minister of Health Regulation No. 7 of 2019. Mopping was proven to reduce the germ count in most rooms, although increases were still found at several points.

It is recommended that the hospital replace the disinfectant solution in each room, use microfiber mops, and increase supervision of cleaning implementation so that the effectiveness of germ count reduction becomes more optimal.

Author's Contribution Statement:

Author's Contribution Statement: Siti Nurazisah Syarifuddin: Conceptualization, Methodology, Investigation, Data Curation, Formal Analysis, Writing – Original Draft, Writing – Review & Editing. Askur: Supervision, Writing – Review & Editing. Sresta Azahra: Supervision, Writing – Review & Editing.

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