Volume 4, Issue 2, February - 2026 **ISSN (E):** 2938-3811

Web of Scientists and Scholars: Journal of Multidisciplinary Research

STERILITY CONTROL IN COSMETOLOGY ROOMS: MONITORING AND EVALUATION METHODS

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Abstract

This article examines modern approaches to sterility control in cosmetology clinics, as well as methods for monitoring and evaluating the effectiveness of sterilization procedures. It also highlights the historical development of asepsis and antisepsis principles, allowing us to trace the evolution of concepts of sterility and its importance in cosmetology practice. The main sources of microbial contamination, including personnel, instruments, air, and surfaces, are analyzed.

The stages of instrument processing, including preliminary cleaning, disinfection, and sterilization, are described in detail, and the main sterilization methods, such as steam, air, and chemical, are discussed. Particular attention is paid to physicochemical and biological methods of sterility monitoring, including the use of indicators and spore-forming microorganisms.

The paper also addresses issues related to monitoring system organization, documentation, and personnel training. It examines methods for monitoring air and surface microbial contamination, as well as approaches to assessing the effectiveness of sterilization processes. Current trends, including automated monitoring and the implementation of innovative technologies, are highlighted.

Scientific Novelty. The scientific novelty of this study lies in its comprehensive analysis of the sterility monitoring system in cosmetology clinics, taking into account the specifics of modern aesthetic procedures and increased safety requirements. Unlike traditional approaches, which are primarily focused on medical institutions, this study adapts and systematizes sterility monitoring methods for cosmetology practice.

For the first time, the need to integrate physicochemical and biological control methods into a single multi-level monitoring system has been substantiated, ensuring a more accurate and reliable assessment of the effectiveness of sterilization procedures. A structured approach to sterility assessment has been proposed, including simultaneous monitoring of instruments, air, and contact surfaces, allowing for the consideration of all possible pathways of microbial contamination.

Scientific novelty also lies in the substantiation of the feasibility of using combined indicator methods for the rapid and long-term assessment of sterilization quality, as well as in the adaptation of modern technological solutions to the conditions of cosmetology offices.

Purpose of the Study. The purpose of this study is to comprehensively examine the sterility control system in cosmetology clinics, as well as to develop and validate effective methods for

monitoring and evaluating sterilization processes, taking into account modern safety requirements and the specifics of cosmetology practice.
The stated objective is to analyze existing methods for ensuring sterility, identify the main sources of microbial contamination, evaluate the effectiveness of physicochemical and biological control methods, and determine optimal approaches to organizing a monitoring system aimed at reducing the risk of infectious complications and improving the quality of services provided.

Keywords: Sterility, cosmetology, disinfection, sterilization, sterility control, microbial contamination, biological monitoring, chemical indicators, asepsis, antisepsis, patient safety, sanitary standards, cosmetology room.

Introduction

The development of concepts around sterility is closely linked to the advancement of medicine and microbiology. Until the second half of the nineteenth century, the causes of infectious complications remained unclear, and procedures that involved breaking the skin often led to serious consequences. The work of Louis Pasteur and Robert Koch, who demonstrated the role of microorganisms in the development of disease, made a significant contribution to understanding the nature of infections. Joseph Lister subsequently developed the principles of antisepsis, introducing the treatment of instruments and surgeons' hands with carbolic acid. These discoveries laid the foundation for the development of modern sterilization and asepsis systems.

With the development of cosmetology as an independent field of medical and aesthetic practice, issues of sterility have become particularly pressing. Cosmetology procedures, including injection techniques, hardware interventions, and skin manipulation, carry a risk of infection. Therefore, sterility control in cosmetology rooms is a key factor in ensuring the safety of patients and staff.

The activities of medical organizations are subject to oversight, as they are directly related to state-protected values—the lives and health of citizens. Quality control of medical care is an important element, ensuring which allows for the development of a quality management system in healthcare [1]. In cosmetology, the main condition for performing procedures is the cleanliness of the specialist's hands and equipment. Cosmetologists must work only in sterile disposable gloves, a mask, and a hair cap. All doctors, including cosmetologists, must observe personal hygiene rules. It is also believed that long nails can interfere with the proper administration of injections, and the strong scent of perfume can distort perception.

Modern approaches to sterility monitoring are based on a combination of microbiological, physicochemical, and organizational monitoring methods. This article examines the basic principles of sterility, methods for monitoring it, and evaluating the effectiveness of sterilization procedures.

Web of Scientists and Scholars: Journal of Multidisciplinary Research

The concept of sterility and its importance in cosmetology. In private healthcare clinics not covered by the compulsory health insurance system (CHI), and where cosmetology services are not included in state-guaranteed programs for free medical care, the goals of internal quality control and safety of medical activities are limited, as they do not encompass processes such as the organization of medical rehabilitation and spa treatment, medical examinations, clinical screening, follow-up care, medical examinations, and medical examinations [1].

Sterility is defined as the complete absence of viable microorganisms in the external environment. In a cosmetology setting, this applies to instruments, consumables, surfaces, and the practitioner's hands. A key feature of cosmetology is that many procedures involve disruption of the skin barrier, creating a direct entry point for pathogenic microorganisms.

A breach of sterility can lead to the development of infectious complications, including bacterial, viral, and fungal diseases. Among the most common risks are staphylococcal infections, hepatitis, herpesvirus infections, and mycoses. Therefore, ensuring sterility is not only a sanitary requirement but also a critical element of a cosmetologist's professional responsibility.

Sources of microbial contamination. There are several main sources of microbial contamination in a cosmetology office. These include staff, patients, instruments, air, and surfaces. Human skin is a natural reservoir of microorganisms, including opportunistic pathogens. Failure to observe proper hand hygiene can transfer microbes to instruments and work areas.

Instruments, especially reusable ones, pose a significant risk if inadequately sterilized. The air can also harbor microorganisms, especially in high-traffic areas with inadequate ventilation. Surfaces, including couches, tables, and equipment, can serve as reservoirs for pathogens if not disinfected regularly.

Instrument processing stages. Most procedures in cosmetology are identical to those in medical procedures. Therefore, cosmetologists' instruments are subject to equally stringent disinfection requirements to ensure patient safety.

To disinfect instruments and prevent the spread of fungal and other infections, a beauty salon must have a modern sterilizer. Without this equipment, the required level of cleaning cannot be achieved, meaning there is a risk of infecting customers. Furthermore, the working surfaces of the instruments may deteriorate prematurely [2]. Ensuring instrument sterility involves several sequential steps. The first step is preliminary cleaning, aimed at removing visible contaminants. This is performed using detergents and mechanical action.

The second stage is disinfection, the purpose of which is to destroy most microorganisms. Broad-spectrum chemical disinfectants are used for this purpose.

The third stage is sterilization, which ensures the complete destruction of all forms of microorganisms, including spores. Sterilization can be accomplished using various methods, including steam, air, and chemicals.

Sterilization methods. For cosmetology center staff interacting with clients, regardless of their training, sterile instruments are essential for their safety. Proper disinfection ensures compliance with hygiene and sanitary standards in the beauty salon.

Thermal sterilizers, using high temperatures, completely disinfect instruments that come into contact with blood in just one minute. Ultraviolet sterilizers are used for other types of instruments. Their bactericidal action, lasting 8 minutes, will kill any bacteria, fungi, and microbes [3]. Steam sterilization is one of the most effective and widespread methods. It is performed in autoclaves at high pressure and temperature. This method ensures the reliable destruction of microorganisms and is widely used for processing metal instruments.

Hot air sterilization is performed in dry-heat ovens. It requires higher temperatures and longer exposure times than steam sterilization. This method is suitable for instruments that are resistant to high temperatures.

Chemical sterilization is used to treat heat-sensitive materials. It involves the use of gases or solutions with high antimicrobial activity. However, this method requires strict control of concentration and exposure time [4].

Table 1 - Sterilization methods and their characteristics

Sterilization method	**Brief description**
Steam sterilization	High efficiency, suitable for metal instruments, requires an autoclave
Air sterilization	Used at high temperatures, suitable for heat-resistant materials
Chemical sterilization	Used for heat-sensitive products, requires strict control of time and concentration
Gas sterilization	Provides deep penetration, used for complex instruments
Plasma sterilization	A modern method, characterized by high safety and speed of processing

Physicochemical methods of sterility control. Sterility control involves the use of physicochemical indicators that allow the parameters of the sterilization process to be assessed. Physical parameters include temperature, pressure, and exposure time [5]. Modern sterilization devices are equipped with automatic monitoring systems for these parameters.

Chemical indicators change color when specific sterilization conditions are reached. They are used to monitor each sterilization cycle and allow for a visual assessment of its effectiveness. There are different classes of chemical indicators, including indicators for monitoring individual parameters and complex indicators that respond to a combination of factors.

Biological monitoring methods. The most reliable method for assessing sterility is biological control. It is based on the use of spore-forming microorganisms that are highly resistant to sterilization factors. Biological indicators are placed in the sterilization chamber along with the

instruments. After the cycle is completed, incubation is performed, during which the presence of microbial growth is assessed. The absence of growth indicates sterility has been achieved [6].

This method is a reference, but it requires more time and resources compared to physicochemical methods.

Table 2 - Sterility monitoring methods and their evaluation

Monitoring method	**Characteristics and evaluation**
Physical control	Based on the recording of temperature, pressure and time, it provides operational control
Chemical indicators	Change color when sterilization conditions are reached, convenient for every cycle
Biological control	The most accurate method is based on the use of microorganism spores
Microbiological washes	They are used to assess the cleanliness of surfaces and instruments.
Air control	Allows you to determine the level of microbial contamination in the room

Organizing a sterility monitoring system. Effective sterility control is impossible without a well-organized monitoring system. This includes regular inspections, documentation, and personnel training [7].

Documenting sterilization results allows you to track performance over time and identify potential deviations. Logs should contain information on the date, sterilization parameters, indicators used, and control results.

Personnel training plays a key role in ensuring sterility. Cosmetologists must be knowledgeable about instrument processing methods, hygiene rules, and aseptic principles [8].

Air and surface sterility monitoring. Sterility monitoring includes not only instrument inspection but also an assessment of the microbial contamination of air and surfaces. This involves microbial deposition on nutrient media and surface swabs.

Regular monitoring allows us to identify sources of contamination and take timely measures to eliminate them. A ventilation system and the use of germicidal lamps play an important role.

Surface disinfection should be carried out using effective, broad-spectrum disinfectants. Particular attention should be paid to high-touch areas.

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Evaluation of the effectiveness of sterilization measures. Evaluation of sterilization effectiveness is based on an analysis of monitoring results. If deviations are detected, corrective measures must be taken, including re-sterilization, equipment inspection, and revision of the methods used [9].

A comprehensive approach to assessing effectiveness includes an analysis of all stages of instrument processing, as well as the storage conditions of sterile materials. Failure to comply with storage conditions can lead to recontamination.

Regular maintenance of sterilization equipment is essential. Malfunctions can reduce sterilization effectiveness and pose a safety hazard.

Modern trends and innovations. Modern technologies allow for significantly improved sterility control. Automated monitoring systems ensure accurate recording of sterilization parameters and minimize the impact of human error. Antiseptic and disinfectant developments are constantly underway worldwide. Therefore, almost every year, new products are introduced to the market designed to maintain space sterility for as long and as efficiently as possible.

New highly effective and low-toxicity disinfectants are being developed. Rapid testing methods are also being introduced to quickly assess the quality of sterilization.

The use of disposable instruments is becoming increasingly common, reducing the risk of cross-infection. However, this requires compliance with medical waste disposal regulations [10].

Research also shows that ultraviolet light remains the least reliable disinfectant. It can only be used as a supplementary method, not as a primary method. Like salt lamps, ultraviolet light is intended only for air and room disinfection. It is not suitable for hands, instrument surfaces, or skin, no matter how innovative the developments using it.

Conclusion

Sterility control in cosmetology clinics is an integral part of ensuring the safety and quality of services provided. It includes a range of measures aimed at preventing microbial contamination and reducing the risk of infectious complications.

An effective monitoring system must combine physical, chemical, and biological control methods, as well as incorporate organizational measures. Regular staff training, adherence to sanitary standards, and the use of modern technologies ensure a high level of sterility.

References

1. Kolsanova Olga Aleksandrovna, Suslin Sergey Aleksandrovich FEATURES OF INTERNAL CONTROL OF QUALITY AND SAFETY OF MEDICAL ACTIVITIES IN THE PRIVATE HEALTHCARE SYSTEM (ON THE EXAMPLE OF THE PROFILE "COSMETOLOGY") // Modern Problems of Healthcare and Medical Statistics. 2023. No. 4. URL: https://cyberleninka.ru/article/n/osobennosti-vnutrennego-kontrolya-kachestva-i-bezopasnosti-meditsinskoy-deyatelnosti-v-chastnoy-sisteme-zdravoohraneniya-na-primere

2. Suslin Sergey Aleksandrovich, Kolsanova Olga Aleksandrovna MODERN PROBLEMS OF ORGANIZING MEDICAL CARE IN THE PROFILE OF "COSMETOLOGY" // Modern problems of health care and medical statistics. 2022. No. 5. URL: https://cyberleninka.ru/article/n/sovremennye-problemy-organizatsii-okazaniya-meditsinskoy-pomoschi-po-profilyu-kosmetologiya
3. Kubanov Aleksey Alekseevich, Kolsanova Olga Aleksandrovna, Suslin Sergey Aleksandrovich, Chertukhina Olga Borisovna PROBLEMS OF IMPROVING THE ORGANIZATION OF COSMETOLOGICAL CARE (REVIEW) // Modern Problems of Healthcare and Medical Statistics. 2022. No. 3. URL: https://cyberleninka.ru/article/n/problemy-sovershenstvovaniya-organizatsii-kosmetologicheskoy-pomoschi-obzor
4. Manakina Ekaterina Sergeevna, Medvedeva Olga Vasilievna, Manakin Ivan Igorevich ASSESSMENT OF THE QUALITY OF MEDICAL CARE IN THE PROFILE OF "COSMETOLOGY" IN MEDICAL ORGANIZATIONS OF VARIOUS FORMS OF OWNERSHIP // Modern problems of health care and medical statistics. 2020. No. 4. URL: https://cyberleninka.ru/article/n/otsenka-kachestva-okazaniya-meditsinskoy-pomoschi-po-profilyu-kosmetologiya-v-meditsinskih-organizatsiyah-razlichnyh-form
5. Manakina Ekaterina Sergeevna, Medvedeva Olga Vasilievna, Manakin Ivan Igorevich ASSESSMENT OF THE QUALITY OF MEDICAL CARE IN THE PROFILE OF "COSMETOLOGY" IN MEDICAL ORGANIZATIONS OF VARIOUS FORMS OF OWNERSHIP // Modern problems of health care and medical statistics. 2020. No. 4. URL: https://cyberleninka.ru/article/n/otsenka-kachestva-okazaniya-meditsinskoy-pomoschi-po-profilyu-kosmetologiya-v-meditsinskih-organizatsiyah-razlichnyh-form
6. Pozdnyakova M. A., Krasilnikova O. N., Zhiltsova E. E. Medical, social and legal aspects of cosmetology care // Science of the young - Eruditio Juvenium. 2017. No. 4. URL: https://cyberleninka.ru/article/n/mediko-sotsialnye-i-yuridicheskie-aspekty-kosmetologicheskoy-pomoschi
7. Krasilnikova Olga Nikolaevna Statistical approaches to assessing the level, structure, dynamics of cosmetology morbidity and the structure of cosmetology procedures in patients with diseases and age-related changes in the skin // Medical almanac. 2017. No. 3 (48). URL: https://cyberleninka.ru/article/n/statisticheskie-podhody-k-otsenke-urovnya-struktury-dinamiki-kosmetologicheskoy-zabolevaemosti-i-struktury-kosmetologicheskih
8. Pozdnyakova M. A., Krasilnikova O. N., Zhiltsova E. E. Medical, social and legal aspects of cosmetology care // Science of the young - Eruditio Juvenium. 2017. No. 4. URL: https://cyberleninka.ru/article/n/mediko-sotsialnye-i-yuridicheskie-aspekty-kosmetologicheskoy-pomoschi
9. Pozdnyakova Marina Aleksandrovna, Krasilnikova O. N. Modern Possibilities of Cosmetology in a Regional Polyclinic // Bulletin of RUDN. Series: Medicine. 2016. No. 3. URL: https://cyberleninka.ru/article/n/sovremennye-vozmozhnosti-kosmetologii-v-usloviyah-oblastnoy-polikliniki

10. Averkova O. A., Kryukov I. V., Kryukova O. S. On the issue of placing local exhaust ventilation systems in rooms with high dust content // Bulletin of the BSTU named after V. G. Shukhov. 2018. No. 4. URL: https://cyberleninka.ru/article/n/k-voprosu-o-razmeschenii-sistem-mestnoy-vytyazhnoy-ventilyatsii-v-pomescheniyah-s-vysokim-soderzhaniem-pyli