

Investigating of Environmental Health Status of Dental Clinics in Ardabil City, Iran, in 2023

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Article Info	ABSTRACT
Article type: Original article	Introduction: Dental care services are a vital component of healthcare, and the status of environmental health control in dental clinics is a key indicator of the quality of health and treatment services provided to patients. This study was conducted with the aim of determining the environmental health status of dental clinics in Ardabil City in the year 2023.
Article History: Received: Sep. 13, 2025 Revised: Oct. 18, 2025 Accepted: Nov. 18, 2025 Published Online: Dec. 02, 2025	Materials & Methods: In this descriptive-sectional study, a census approach was used to investigate 12 dental clinic units in Ardabil City. Data collection was performed by trained researchers through site visits to the dental clinics and by reviewing their recorded information at the Comprehensive Health Service Centers of Ardabil City, using a standardized clinical inspection checklist. The collected data were analyzed using Microsoft Excel software.
 Correspondence to: Ali Amarloei Center for Health and Environmental Research, Ilam University of Medical Sciences, Ilam, Iran	Results: According to the research findings, the highest compliance rate with regulations was observed in the Specific Clinic Regulations section (86.46 % frequency), while the lowest compliance rate pertained to the Building Safety and Hygiene section (77.50 % frequency). The overall mean compliance status for environmental health in Ardabil City's dental clinics with the regulations was 81.40 %..
Email: amarloei@yahoo.com	Conclusion: To enhance the environmental health standards of dental clinics in Ardabil City, following up on the non-conformities in the Building Health and Safety section, along with addressing the proper management of produced waste in these centers, will be effective. It is also suggested to utilize the capacity of auditing companies and specialized teams to improve the quality of services and performance of dental clinics. This should be accompanied by continuous training, supervision, and monitoring by environmental health experts, representatives of the Office for Supervision of Treatment Affairs, and the Medical Council within these centers.
	Keywords: Dental Clinics, Environmental Health, Ardabil

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Introduction

Environmental health is a discipline that studies and controls all factors influencing human living environments including physical, chemical, and biological parameters that may lead to diseases, disabilities, or reduced comfort and well-being (1). According to the Environmental Health Regulation, ratified by the Council of Ministers in 1992, dental offices and clinics are classified as public establishments that provide healthcare and medical services to patients (1, 2).

In dental clinics, patients receive diagnostic and outpatient treatment services. When continuous monitoring or hospitalization is required, they are referred to specialized medical centers or hospitals (3). Due to the presence of numerous patients with different health conditions, dental offices and clinics have a high potential for generating and disseminating health-related hazards. Therefore, maintaining proper environmental health control measures in these centers is essential to prevent the transmission of infectious and potentially life-threatening diseases to other individuals in the community (4, 5).

Observance of environmental health standards — such as providing safe drinking water, hygienic wastewater disposal, appropriate management of infectious and non-infectious waste, maintaining optimal temperature, humidity, and ventilation, ensuring sufficient lighting and space for service provision, and adherence to building health and safety principles — is crucial in healthcare facilities such as dental offices and clinics. Compliance with hygiene protocols by staff members, including proper handwashing, systematic sterilization of instruments, and correct use of disposable materials, plays a vital role in maintaining and improving patients' health and in preventing the spread of infectious diseases (6).

Implementing infection control programs is indispensable to minimize microbial transmission from patients to dental personnel and other patients

(7). Paying attention to these sanitary indicators helps optimize and strengthen overall health in healthcare delivery environments. Preventive science can further predict, identify, measure, and control diseases and injuries resulting from poor adherence to hygienic standards. Therefore, achieving these health objectives requires consistent attention to environmental health regulations and guidelines (4).

As stated in Article 7 of the Environmental Health Regulation, environmental health experts working in healthcare institutions are mandated to inspect public places, such as dental clinics, for compliance with sanitation and safety codes. In cases where violations are detected, these experts are required to report the offenders and proprietors to judicial authorities (8).

Various studies have investigated the environmental health status of healthcare facilities across Iran (1, 7, 9). Although such centers are designed to enhance public health, inadequate sanitary conditions can lead to 5–30% of visitors acquiring new infectious diseases after their visit. Additionally, improper management of solid waste, wastewater, and contaminated gaseous emissions from these centers can contribute to environmental pollution. In Iran, private and public dental clinics play an important role in improving general health and social welfare (3).

Hence, a lack of proper control over potential health hazards related to dental care can increase the risk of infectious disease transmission among dentists, staff, and patients (10). Assessing the environmental health conditions of dental clinics can provide the foundation for developing effective preventive and corrective action plans to enhance sanitation standards in the future.

Considering the significance of this issue, the present study aimed to Investigating the environmental health status of dental clinics in Ardabil city in 2023.

Materials and methods

The present research was conducted as a descriptive cross-sectional study aimed at determining the

environmental health status of dental clinics in Ardabil city in 2023. In this study, a total of 12 active dental clinic units operating in the city of Ardabil were examined through a census sampling method.

Data collection was carried out by a trained investigator through on-site visits to dental clinics and by reviewing their recorded information at the Comprehensive Health Service Centers of Ardabil city. During these visits, the researcher completed a dental clinic inspection checklist specifically designed for this study.

The checklist was developed based on the guidelines of the Center for Health and Occupational Environment, consisting of 62 questions categorized into five domains: Personal hygiene of staff and clients (13 items), Hygiene and sterilization of tools and equipment (13 items), Building hygiene and safety (20 items), Waste management (8 items), Specific regulatory standards of dental clinics (8 items). Data obtained from the completed checklists were analyzed using Microsoft Excel software. To determine the sanitary status or compliance level of each assessed domain, the following formula was used (11, 12):

$$\text{Compliance rate (\%)} = \frac{\text{Frequency of items conforming to health regulations}}{\text{Total frequency of assessed items}} \times 100$$

Results

The present study was conducted across five dimensions: Personal Hygiene of Staff and Clients, Hygiene of Instruments and Equipment, Building Hygiene and Safety, Waste Management, and Specific Regulations for Dental Clinics, with the overall objective of determining the environmental health status of dental clinics in Ardabil City in 2023.

In Table 1, regarding the hygiene indicators for the personal hygiene of staff and clients, the highest compliance rates (100 %) were observed for the

correct handwashing procedure, prohibition of work for staff infected with contagious diseases, prohibition of selling and using tobacco products, and the use of sterile disposable instruments and sterile examination kits. Deficiencies in this domain, which were found to be non-compliant with the regulations in 41.67 % of cases, primarily related to the lack of personal protective equipment usage, absence of vaccination records for treatment personnel, and inadequate disinfection of the suction unit and its components.

Table 1. Status of Personal Hygiene Indicators for Staff and Clients in Ardabil City Dental Clinics in 2022

Row	Parameters	Compliance with Regulation (%)	Non-Compliance (%)
1	*Correct Handwashing	100	0
2	Handwashing Guide Display	75	25
3	Prohibition of Work for Staff Infected with Contagious Diseases	100	0
4	Prohibition of Selling and Using Tobacco Products	100	0
5	Display of Non-Smoking Signage	83.33	16.67
6	Use of Clean, Light-Colored Lab Coats	83.33	16.67
7	Designated Storage Area for Supplies	66.67	33.33
8	Vaccination of Treatment Staff Against Diseases	58.33	41.67
9	Infection Control Training Certificate for Treatment Staff	83.33	16.67
10	Use of Personal Protective Equipment	58.33	41.67

11	Use of Sterile Disposable Instruments	100	0
12	Disinfection of Suction Unit and Its Components	58.33	41.67
13	Sterile Examination Kit for Each Patient	100	0

*Critical items

In Table 2, findings concerning the hygiene of instruments and equipment showed that the use of disposable blades and needles was compliant in 100 % of the units. Furthermore, records of self-control processes and health self-declarations by the owner were not observed in any of the examined units.

Despite 83.33% of units being equipped with standard disinfection supplies, adherence to proper sterilization protocols remained inadequate. In 41.67% of cases, instrument sterilization and disinfection procedures were reported to be in violation of established guidelines.

Table 2. Status of Instrument and Equipment Hygiene Indicators in Ardabil City Dental Clinics in 2022.

Row	Parameters	Compliance with Regulation (%)	Non-Compliance (%)
1	*Use of Disposable Blades and Needles	100	0
2	*Adherence to Correct Instrument Disinfection Principles	58.33	41.67
3	*Sterilization of Used Instruments	58.33	41.67
4	Use of Standard Periapical Radiography Device	100	0
5	Provisions for Instrument Washing and Disinfection	83.33	16.67
6	Standard Disinfectant and Germicidal Solutions	83.33	16.67
7	Separate Handwashing Sink for Clients	100	0
8	Presence of a Sink Separate from Instrument Washing Sink	91.67	8.33
9	Standard Materials and Medications	100	0
10	Status of Shelves, Drawers, etc.	91.67	8.33
11	Status of Chairs, Furniture, etc.	91.67	8.33
12	Installation of First Aid Kit with Necessary Items	91.67	8.33
13	Health Self-Control and Self-Declaration Process by Owner	0	100

*Critical items

In Table 3, concerning building hygiene and safety, all studied units benefited from a standard water supply system (100 % compliance). Conversely, the examination of other parameters in this section

indicated that the lowest compliance rates (58.33 %) were associated with the status of toilets, adequate lighting, and the presence of a validly charged fire extinguisher.

Table 3. Status of Building Hygiene and Safety Indicators in Ardabil City Dental Clinics in 2022.

Row	Parameters	Compliance with Regulation (%)	Non-Compliance (%)
1	*Water Supply System	100	0
2	Wastewater Collection and Disposal System	83.33	16.67
3	Necessary Provisions for Insect and Rodent Control	66.67	33.33
4	Standard Heating and Cooling System	91.67	8.33

5	Standard Status of the Dental Unit Space	66.67	33.33
6	Status of Rest Area	66.67	33.33
7	Status of Sanitary Facilities	58.33	41.67
8	Functional Flushing Tank in Sanitary Facilities	75	25
9	Wall Covering Near the Sink	83.33	16.67
10	Building Floor Covering	83.33	16.67
11	Building Wall Covering	75	25
12	Building Ceiling Covering	91.67	8.33
13	Doors and Windows	75	25
14	Temperature and Humidity	91.67	8.33
15	Adequate Lighting	58.33	41.67
16	Adequate Ventilation	75	25
17	Fire Extinguisher with Valid Charge	58.33	41.67
18	Hygiene Status of the Pantry	83.33	16.67
19	Adherence to Hygiene Principles in the Pantry	83.33	16.67
20	Status of Safety Compliance	83.33	16.67

*Critical items

In Table 4, regarding the waste management system indicators for dental clinics in Ardabil City, the highest compliance rate (100 %) was related to the correct and principled disposal of amalgam and other excess materials. Records of contracts with waste inactivation companies and the segregation of

infectious waste from non-infectious waste were compliant in only 66.67 % of the examined units. Furthermore, the disposal of sharp and pointed waste was non-compliant with regulations in 16.67 % of the surveyed units.

Table 4. Status of Waste Management Indicators in Ardabil City Dental Clinics in 2022.

Row	Parameters	Compliance with Regulation (%)	Non-Compliance (%)
1	*Correct Disposal of Sharp and Pointed Waste	83.33	16.67
2	Use of Colored Bags for Waste Segregation	75	25
3	Records of Contracts with Waste Inactivation Companies	66.67	33.33
4	Lidded, Pedal-Operated, and Washable Waste Bins	83.33	16.67
5	Temporary Waste Storage Area	83.33	16.67
6	Frequency of Daily Waste Collection	83.33	16.67
7	Segregation of Infectious from Non-Infectious Waste	66.67	33.33
8	Correct and Principled Disposal of Amalgam and Other Consumed Materials	100	0

*Critical items

Table 5 details the specific regulations section for dental clinics. Records of radiation training courses for users and the use of personal protective equipment

against radiation were reported as non-compliant in 33.33 % and 41.67 % of cases, respectively.

Table 5. Status of Indicators Related to Specific Regulations in Ardabil City Dental Clinics in 2022.

Row	Parameters	Compliance with Regulation (%)	Non-Compliance (%)
1	Status of Dental Radiography Center Construction in Basements	100	0

2	Installation of Lead Shielding or Lead Room in Dental Radiography Center	100	0
3	Dental Radiography Device with Quality Control Approval	100	0
4	Records of Radiation Training Courses for Users	66.67	33.33
5	Use of Personal Protective Equipment Against Radiation	58.33	41.67
6	Construction of Center in a Non-Residential Building	100	0
7	Sketch and Map of the Unit Building	75	25
8	Installation of Compressor in an Area Away from Rooms and Waiting Hall	91.67	8.33

Finally, Table 6 summarizes the overall findings. The highest overall compliance rate corresponded to the section on Specific Regulations for Dental Clinics (86.46 %), while the lowest compliance rate was

associated with the Building Hygiene and Safety section (77.50 %). Overall, the general compliance status across all examined indicators for dental clinics in Ardabil City was 81.40 %.

Table 6. Overall Status of Environmental Health Indicators in Ardabil City Dental Clinics in 2022.

Row	Health Indicator Status	Compliance with Regulation (%)	Non-Compliance (%)
1	Personal Hygiene of Staff and Clients	82.05	17.95
2	Hygiene of Instruments and Equipment	80.77	19.23
3	Building Hygiene and Safety	77.50	22.50
4	Waste Management	80.21	19.79
5	Specific Regulations for Dental Clinics	86.46	13.54
Overall Average		81.40	18.60

Discussion

In the present study, dental clinics in Ardabil City were assessed across five dimensions: Personal Hygiene of Staff and Clients, Hygiene of Instruments and Equipment, Building Hygiene and Safety, Waste Management, and Specific Dental Clinic Regulations.

In the assessment of the personal hygiene of staff and clients, non-use of personal protective equipment was found to be non-compliant with regulations in 58.33 %of cases. In a comparative study conducted by Bancescu et al. in Romania in 1999, assessing private and public clinics, the correct use of personal protective equipment, such as gowns, gloves, masks, and goggles, was observed in less than 10 %of the studied units (13). In the current investigation, staff

working in the clinics attributed the lack of personal protective equipment usage during work to the insufficient provision of required protective equipment (gowns, disposable gloves, goggles, etc.) by the department heads. In our study, the inadequate disinfection of the suction unit and its components, along with the absence of staff vaccination records, were deemed non-compliant in 41.67 %of cases. Similarly, a study by Bancescu et al. in Romania in 1999 reported that the accuracy and quality of disinfection and sterilization were satisfactory in half of the units, where alcohol and sodium hypochlorite solution were predominantly used as disinfectants (13). In the present research, interviews with assistants and dentists in the clinics revealed that all were aware of correct disinfection methods, stating they used 70 %alcohol solution for hand antisepsis

and Deconex solution for instrument and equipment disinfection. A study by Ali Hosseini et al. in Bushehr in 2012 (1391 A.H.) showed that dentists did not use personal protective equipment when working with radiation in 76.5 %of cases (1). Naser Khaki et al. in 1998 (1377 A.H.) examined the performance of dentists regarding adherence to personal protection and sterilization principles, reporting that 69.4 %of dentists consistently used gloves during work. Furthermore, only 10.4 %of personnel had sufficient knowledge regarding the correct application (temperature and time) of the hot-air oven (foren), and 4 %for the autoclave (14). McCarthy et al. in Ontario, Canada, in 1994, evaluated infection control status in dental workplaces, finding that only 7.7 %of dentists and 8.6 %of other clinic staff were vaccinated against Hepatitis B (15). Hepatitis B can be transmitted via the eyes, saliva, and even contact with contaminated surfaces, posing a threat to staff health (16 and 17). Simple colds to diseases like tuberculosis, Hepatitis B, and AIDS can all jeopardize the health of staff working in dental clinics (1). Therefore, implementing control measures such as the correct use of personal protective equipment, vaccination, and attention to the disinfection and sterilization of dental tools and instruments can be effective.

According to the research findings in the instrument and equipment hygiene section, the use of disposable needles and blades, standard periapical radiography devices, a separate handwashing sink for clients, and standard materials and medications were compliant with regulations in 100 %of the studied units. However, records of health self-control and self-declaration processes by the owner were absent in any of the surveyed units. Despite the operation of self-control and self-declaration companies in Ardabil City, the health authorities in Ardabil have not yet mandated the implementation of this process for dental offices, clinics, and other health-treatment service providers. This is while Ardabil health officials can utilize the capacity of environmental health assessors working in these companies to

conduct health inspections of health-treatment service centers by providing the necessary platforms.

The disinfection of instruments used in offices and dental clinics is another critical standard affecting the health of clients and staff. In the present study, despite the presence of provisions for washing and disinfecting instruments and equipment, and standardized disinfectant and germicidal solutions in 83.33 %of units, the sterilization of used instruments and adherence to correct disinfection principles were reported as non-compliant in 41.67 %of cases. In a study by Ali Hosseini et al. in Bushehr in 2012 (1391 A.H.), the use of appropriate disinfectant solutions for units and other parts, as well as attention to autoclaving sterilization, was compliant in 97.8 %of cases. Furthermore, the disinfection of instruments used by dentists was reported as satisfactory in 91.1 %of cases (1).

The provision of safe and sanitary water from public and private networks for drinking, handwashing, and as input water for units, etc., is essential in dental offices and clinics (1). In the present study, concerning building hygiene and safety, all studied units had a standard water supply system. However, the examination of other parameters indicated that the lowest compliance rates (58.33 %) pertained to the status of sanitary facilities, provision of adequate lighting, and the presence of a validly charged fire extinguisher. In the study by Ali Hosseini et al. in Bushehr in 2012 (1391 A.H.), the status of sanitary facilities was satisfactory in 82 %and adequate lighting provision in 93.3 %of cases, whereas the placement of fire extinguishers was non-compliant in 48.4 %of the studied units (1). In our study, the reasons for the low compliance rate in these sub-sections were insufficient cleaning of sanitary facilities, malfunctioning toilet flush tanks in some units, the absence of window screens, and defective hoods inside the toilets, as well as the type and number of lamps, their failure, and the overall inappropriateness of the clinic environment lighting for the sensitive activities of dentists. Various studies

have highlighted the importance of adhering to safety issues, such as the proper installation and placement of fire extinguishers, with the vast majority mentioning inattention to safety issues as one of the deficiencies in the monitored locations (18-21). The existence of such minor non-conformities in the building hygiene and safety section led to a 22.50 %overall non-compliance rate across the studied units, necessitating follow-up and resolution by the university's health and medical officials to improve the situation in this area.

Dental wastes constitute a significant portion of the total health and medical waste in Iran, containing pathogenic agents and toxic chemicals. These wastes may endanger the health of patients, staff, and other visitors to dental clinics (22).

In the section assessing the waste management system indicators for Ardabil City's dental clinics, the highest compliance rate (100 %) with the regulations was observed for the correct and principled disposal of amalgam and other excess materials. A similar investigation by Pandari et al. in Yazd City in 2015 (1394 A.H.) indicated that 70.6 %of dental assistants were familiar with the correct principles for amalgam disposal, storing excess amalgam in sealed, specialized solutions (10). In the present study, the disposal of sharp and cutting waste was found to be non-compliant with regulations in 16.67 %of the examined units, as the presence of needle tips in general waste bins was occasionally observed in these facilities. In a study by Ali Hosseini et al. in Bushehr in 2012 (1391 A.H.), the failure to use a sharps disposal container was evident in 12.8 %of private offices (1). One of the main routes of infection transmission in health centers is injuries caused by sharp and cutting objects, such as contaminated needle tips (containing patient's blood and saliva), which must be segregated into sharps containers (23). This observation underscores the critical importance of avoiding the placement of sharp and cutting objects within plastic coverings or nylon bags. It appears that factors such as excessive

workload, insufficient monitoring, and inadequate attention of dental clinic personnel to the necessity of segregating sharp and cutting instruments into appropriate safety boxes are among the underlying causes of this non-compliance.

The present review also revealed that records of contracts with waste pre-treatment/inactivation companies and the segregation of infectious from non-infectious waste complied with regulations in only 66.67 %of the units examined. Shahbazi et al. in 2005 (1384 A.H.) reported the adherence to principles of segregating infectious and non-infectious waste in the dental offices of Nahavand City to be compliant in 62.06 %of the units (9).

The prerequisite for a successful waste management system implementation in Ardabil City's dental clinics is, firstly, the training of dentists on activities related to waste reduction, segregation, etc., through the inclusion of these topics in continuing education courses. Secondly, this requires the principled management of center waste through contracting with active companies for the collection and inactivation of infectious waste generated by dental clinics. Furthermore, decisive action based on laws and regulations against non-compliant centers can be effective in addressing improper waste management.

In the section on Specific Dental Clinic Regulations, the status of establishing the dental radiography center on lower floors, the installation of a lead screen or lead-lined room in the dental radiography center, the radiography device having a quality control certification, and the establishment of the center in a non-residential building were all reported as compliant (100 %) across all examined units. Moreover, in this section, records of radiation handling training courses for users and the use of personal protective equipment against radiation were reported as non-compliant in 33.33 %and 41.67 %of cases, respectively. In the current study, some clinics intermittently organized training classes on radiation exposure hazards for their staff under the supervision of the Atomic Energy Organization of Iran. However,

it seems that non-attendance at radiation handling courses or failure to renew such retraining, coupled with insufficient supervision regarding the mandatory use of personal protective equipment by operators during radiological work, account for the non-compliance in these subsections. In similar studies, Hakimabadi et al. investigated the adherence to protection principles in diagnostic radiography sections of hospitals in North Khorasan Province in 2012 (1391 A.H.). Their findings indicated that gonadal and thyroid shields were absent in 2 hospital units during radiography, and one hospital lacked radiation warning signs, although lead protective shielding was present in 100 % of the studied hospitals (24). In the research by Ali Hosseini et al. in Bushehr in 2012 (1391 A.H.), dentists were not using protective lead shielding while working with radiation in 76.5 % of cases. Conversely, lead shielding on walls, the provision of personal protective equipment, and the installation of a radiation danger light at the room entrance were all reported as satisfactory (100 %) in all examined units (1).

Although the compliance index for the specific regulations of Ardabil City's dental clinics was 86.46 %, given the paramount importance of observing protection and safety issues in this section to preserve the health of staff and clients, it is recommended that the officials in the field of health, treatment, and the Medical Council utilize the potential of specialized companies in the fields of equipment calibration, engineering designs, and the provision of continuous and necessary training on the principles of radiation protection and safety for personnel working in Ardabil City's dental clinics.

Based on the findings of the research, the compliance status with regulations for the following key indicators in Ardabil City's dental clinics were: Personal Hygiene of Staff and Clients (82.05 %), Hygiene of Instruments and Equipment (80.77 %), Building Hygiene and Safety (77.50 %), Waste Management (80.21 %), and Specific Clinic

Regulations (86.46 %). In a comparable study, Ali Hosseini et al. in Bushehr City in 2012 (1391 A.H.) evaluated the status of environmental health indices, reporting satisfactory levels in the following areas: Building Health (85.3 %), Status of Sanitary Facilities (82 %), Waste Management (87.2 %), Ensuring Client Health (75.8 %), Safety (61.1 %), Wastewater (95.3 %), and Sanitary Installations (99.1 %) across the studied units (1).

Conclusion

To enhance the level of environmental health in the dental clinics of Ardabil City, it is deemed essential to resolve the existing non-conformities, with a particular emphasis on the Building Hygiene and Safety section. Therefore, the following measures are recommended:

1. Establishing the necessary platforms to utilize the capacity of self-control and health self-declaration companies for inspecting Ardabil City's dental clinics.
2. Providing essential training by environmental health experts or conducting specialized courses for staff working in dental clinics on Infection Control and correct principles of Disinfection and Sterilization.
3. Contracting with active companies in the field of Infectious Waste Management and Inactivation.
4. Forming a special working group comprising environmental health experts, representatives from the Treatment Supervision Office, and the Provincial Medical Council to ensure continuous monitoring and control of dental centers in Ardabil City.

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Ethics approval

This study was approved by the Ethics Committee of Ilam University of Medical Sciences (Iran) (IR.MEDILAM.REC.1404.206). The authors avoided data fabrication, falsification, plagiarism, and misconduct.

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Conflict of interest

There is no conflict of interest between authors.

Authors' contributions

Conceptualization, Methodology, Validation, Formal Analysis, Investigation, Resources, Software, Writing–Original Draft Preparation, Visualization, Supervision, Project Administration: AM, AA and Data Curation, Writing–Review & Editing: AM, AA, MA

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