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HYGIENIC ASSESSMENT OF HEALTHCARE AND PREVENTIVE FACILITIES BASED ON PROJECT DOCUMENTATION

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ABSTRACT: The hygienic condition of healthcare and preventive facilities is influenced by planning decisions made before construction and commissioning. Project documentation enables assessment of site organization, functional zoning, patient and staff flows, room composition, water supply, wastewater disposal, ventilation, lighting, finishing materials, and healthcare waste management. This article presents a structured approach to the hygienic assessment of such facilities at the project-documentation stage. The framework includes review of architectural and engineering documents, analysis of functional relationships, identification of potential hygienic risks, and preparation of recommendations. No institution-specific measurements or inspection findings are claimed because no individual project file or field data were provided. The proposed approach is intended to support early identification of design deficiencies and the protection of patients, healthcare workers, and visitors.

Keywords: healthcare facilities, preventive medicine, project documentation, hygienic assessment, sanitary requirements, functional zoning, ventilation, infection prevention.

INTRODUCTION

Healthcare and preventive facilities are specialized buildings where architectural planning and engineering decisions directly affect the safety and quality of medical care. These institutions accommodate patients with different health conditions, diagnostic and treatment procedures, laboratory activities, and the handling of potentially infectious materials. Therefore, hygienic requirements should be incorporated during planning and design rather than addressed only after construction.

Project materials provide an opportunity to determine whether the proposed facility can ensure safe conditions for patients, personnel, and visitors. Site plans, architectural drawings, room schedules, explanatory notes, and engineering specifications make it possible to evaluate functional zoning, movement routes, separation of clean and potentially contaminated processes, and the provision of essential sanitary conditions. Early review can identify deficiencies while design changes remain feasible.

The hygienic requirements of a facility depend on its medical profile and capacity. An outpatient clinic, inpatient hospital, maternity unit, diagnostic centre, and infectious-disease facility

have different operational needs. Nevertheless, common principles include rational site planning, appropriate functional zoning, prevention of cross-contamination, adequate lighting and ventilation, reliable water supply, safe wastewater disposal, suitable sanitary facilities, and proper healthcare waste management.

The aim of this article is to describe a systematic method for hygienically assessing healthcare and preventive facilities on the basis of project materials, focusing on the principal planning, sanitary, and engineering factors that may influence health and safety.

METHODS

This article presents a methodological framework for reviewing project documentation used in the hygienic assessment of healthcare and preventive facilities. No specific architectural drawings, engineering calculations, inspection records, or laboratory measurements were supplied; consequently, the article does not report facility-specific compliance findings or quantitative results.

The review should include the general site plan and land-use documentation; architectural drawings, floor plans, sections, room schedules, and explanatory notes; technical documentation for heating, ventilation, water supply, sewerage, and electrical systems; lighting calculations and equipment specifications; healthcare waste-management arrangements; and information on the intended medical profile, capacity, patient flow, and staffing, where available.

Documents are assessed through a structured checklist. First, the declared purpose and capacity of the institution are compared with the proposed composition of rooms and functional units. Second, site organization and internal layouts are reviewed to identify possible conflicts between patient, staff, supply, clean-material, and waste routes. Third, sanitary and engineering provisions are checked for completeness and consistency with the architectural plans. Finally, observations are classified as confirmed inconsistencies, missing information requiring clarification, or recommendations for further verification.

The assessment is qualitative unless the submitted project contains sufficient numerical information for calculation-based evaluation. Compliance must be checked against the current sanitary rules, building regulations, technical standards, and other legal requirements applicable in the jurisdiction and to the specific medical profile. Numerical limits should not be assumed where the relevant standard has not been verified.

RESULTS

The methodological review identifies eight principal domains that should be addressed in the hygienic assessment of project materials. These domains represent assessment criteria rather than findings from an inspection of a particular institution.

1. Site and surrounding territory

The general site plan should demonstrate that the facility is positioned and organized appropriately for its medical function. Review should cover access for patients, emergency vehicles, staff, deliveries, and service transport, as well as the separation of pedestrian and vehicle movement where required. Entrances, loading areas, waste-storage points, utility structures, and outdoor

patient areas should be assessed in relation to one another. Potential external influences such as noise, dust, vibration, and other environmental impacts should also be considered. Landscaping and maintained outdoor areas may contribute to a healthier environment.

2. Functional zoning and internal planning

Functional zoning is a central element of hygienic design. Floor plans and room schedules should show whether departments are grouped according to their functions and whether their relationships support safe workflows. Reception and waiting areas, examination and treatment rooms, inpatient units, diagnostic departments, laboratories, sterilization areas, staff facilities, storage rooms, and technical spaces should be arranged logically.

Particular attention should be paid to separating areas with different hygienic requirements. Clean and potentially contaminated processes should not intersect in ways that create avoidable risks. Patient, personnel, sterile-supply, reusable-equipment, linen, food, and waste routes should be considered separately where the medical function requires it. Room dimensions, circulation areas, occupancy assumptions, and the relationship between capacity and projected workload should be checked against applicable requirements.

3. Water supply, sanitation, and wastewater

Project documentation should identify the water source and distribution system, provision of hot and cold water, and the location of sanitary fixtures and handwashing facilities. The assessment should determine whether water is available in rooms where clinical procedures, cleaning, personal hygiene, and other water-dependent activities are planned. Wastewater collection and disposal arrangements should be described and coordinated with the architectural layout.

Where special treatment, storage, or quality-control measures are required by the facility profile or applicable regulations, these should be reflected in the project. A water connection shown on a general engineering plan does not by itself demonstrate adequate sanitary provision in every functional unit.

4. Ventilation, heating, and indoor air quality

Ventilation and heating systems are essential for maintaining an appropriate indoor environment. The project should identify the ventilation approach for relevant departments, the location of air intakes and exhaust outlets, and intended air movement between spaces where this is important for infection prevention or process safety. The suitability of the system should be considered for examination rooms, operating areas, isolation rooms, laboratories, sanitary rooms, and other specialized spaces.

Ventilation schedules and calculations should correspond to room names, areas, occupancy, and functional designation on the architectural drawings. The review should also consider temperature control, maintenance access, and filter replacement or cleaning where applicable. If calculations or system descriptions are absent, this should be recorded as missing information rather than treated as proof of non-compliance.

5. Natural and artificial lighting

Lighting affects visual performance, comfort, and the safe completion of medical procedures. Project review should include window placement, room orientation, potential obstruction of daylight, and planned artificial lighting. Different rooms may require different lighting characteristics according to their function. Lighting calculations and equipment specifications should be checked where provided, including glare, shadows, maintainability, and suitability of luminaires for the intended environment. Numerical illumination requirements must be verified against current standards for each room type.

6. Finishing materials and sanitary maintenance

Specifications for floors, walls, ceilings, doors, and work surfaces should be assessed in relation to activities performed in each room. In clinical and hygiene-sensitive areas, surfaces should support routine cleaning and disinfection and meet applicable technical and sanitary requirements. Junctions, corners, service penetrations, and other details should be reviewed because poorly resolved surfaces can complicate cleaning. Materials should also be suitable for expected moisture, chemical exposure, mechanical wear, and cleaning procedures.

7. Healthcare waste management

The project should explain how healthcare waste will be collected at the point of generation, segregated according to its applicable category, moved within the building, temporarily stored, and removed from the site. Waste-collection points and temporary storage areas should be evaluated in relation to patient areas, clean supplies, food-service spaces, and public circulation. The design should provide adequate space and access for safe handling while reducing accidental contact and cross-contamination.

The proposed waste routes and storage arrangements should be compatible with the operational plan and current requirements. If a waste-management procedure is mentioned but the necessary rooms, routes, or technical provisions are not shown, this should be recorded as a documentation gap.

8. Integrated evaluation and reporting

The final review should consolidate observations from all assessment domains. Each observation should identify the relevant drawing or document, describe the issue, explain its potential hygienic significance, and specify the additional information or corrective action required. Deficiencies may include conflicts in the layout, insufficient engineering detail, missing calculations, unclear workflows, or design features requiring confirmation against current regulations.

The assessment report should distinguish confirmed inconsistencies from issues that cannot be evaluated because information is missing, and from recommendations intended to improve operational safety. This distinction prevents assumptions from being presented as verified facts and makes the review traceable for designers and healthcare administrators.

DISCUSSION

Review of project documentation is a preventive component of public health protection. Its main advantage is that potential hygienic problems can be identified before construction or reconstruction, when design changes are generally more feasible than alterations to an operating facility. A systematic approach also reduces the risk of assessing engineering systems separately from the functional layout and actual medical processes.

The integrated nature of the assessment is particularly important. The adequacy of a treatment room cannot be judged solely by its floor area: its intended function, patient capacity, access to handwashing, ventilation, lighting, finishes, equipment placement, and connection to supporting spaces must also be considered. Similarly, a waste-storage room may be suitably specified in isolation but still create a hygienic concern if its access route crosses a clean-supply route or a heavily used patient area.

The assessment must be tailored to the profile of the institution. Requirements for infectious-disease departments, operating units, maternity services, laboratories, outpatient clinics, and general inpatient wards are not interchangeable. Reviewers should therefore use current regulations relevant to the facility type and avoid applying generic numerical criteria where specialized requirements exist.

Project documentation describes a proposed facility rather than its actual performance. A design review cannot confirm real air-exchange rates, water quality, illumination, noise levels, indoor temperature, or the effectiveness of operational cleaning. These characteristics require verification through construction supervision, commissioning tests, measurements, and subsequent sanitary inspection. The project-stage assessment is therefore one component of continuous hygienic control.

The quality of the assessment depends on the completeness and coordination of submitted documents. Architectural plans, engineering drawings, equipment layouts, room schedules, and operational descriptions should be mutually consistent. Where essential information is absent, the appropriate outcome is a clearly stated request for additional documentation or later verification, not an unsupported conclusion about compliance.

The framework described in this article can assist hygienists, public health specialists, designers, and healthcare administrators in organizing the review of project materials. Applying it systematically may improve communication between specialists and help incorporate health-protective considerations before a facility enters service.

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