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Quality and Accreditation Institute

Centre for Accreditation of Health and Social Care



GUIDELINES FOR HEATING, VENTILATION, AND AIR CONDITIONING (HVAC) IN OPERATION THEATRE

FIRST EDITION

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These guidelines are developed to support applicant/ accredited Health Care Facilities (HCFs). These guidelines constitute addendum to the requirements under various QAI accreditation standards and are applicable to applicant/ accredited HCFs. All applicant/ accredited HCFs may like to adopt and comply with these guidelines.

QAI assessors of various accreditation programmes under the Centre for Accreditation of Health & Social Care (CAHSC) should check the adherence to these guidelines during assessments.

Abbreviations:

1. AC: Air Conditioner
2. AHU: Air Handling Unit
3. ASHRAE: The American Society of Heating, Refrigerating and Air-Conditioning Engineers
4. DG: Diesel Generator
5. HCF: Healthcare Facility
6. HEPA: High Efficiency Particulate Air
7. HVAC: Heating, Ventilation and Air Conditioning
8. ISHRAE: The Indian Society of Heating, Refrigerating and Air-Conditioning Engineers
9. ISO: International Organization for Standardization
10. MERV: Minimum Efficiency Reporting Values
11. OT: Operation Theatre
12. RH: Relative Humidity

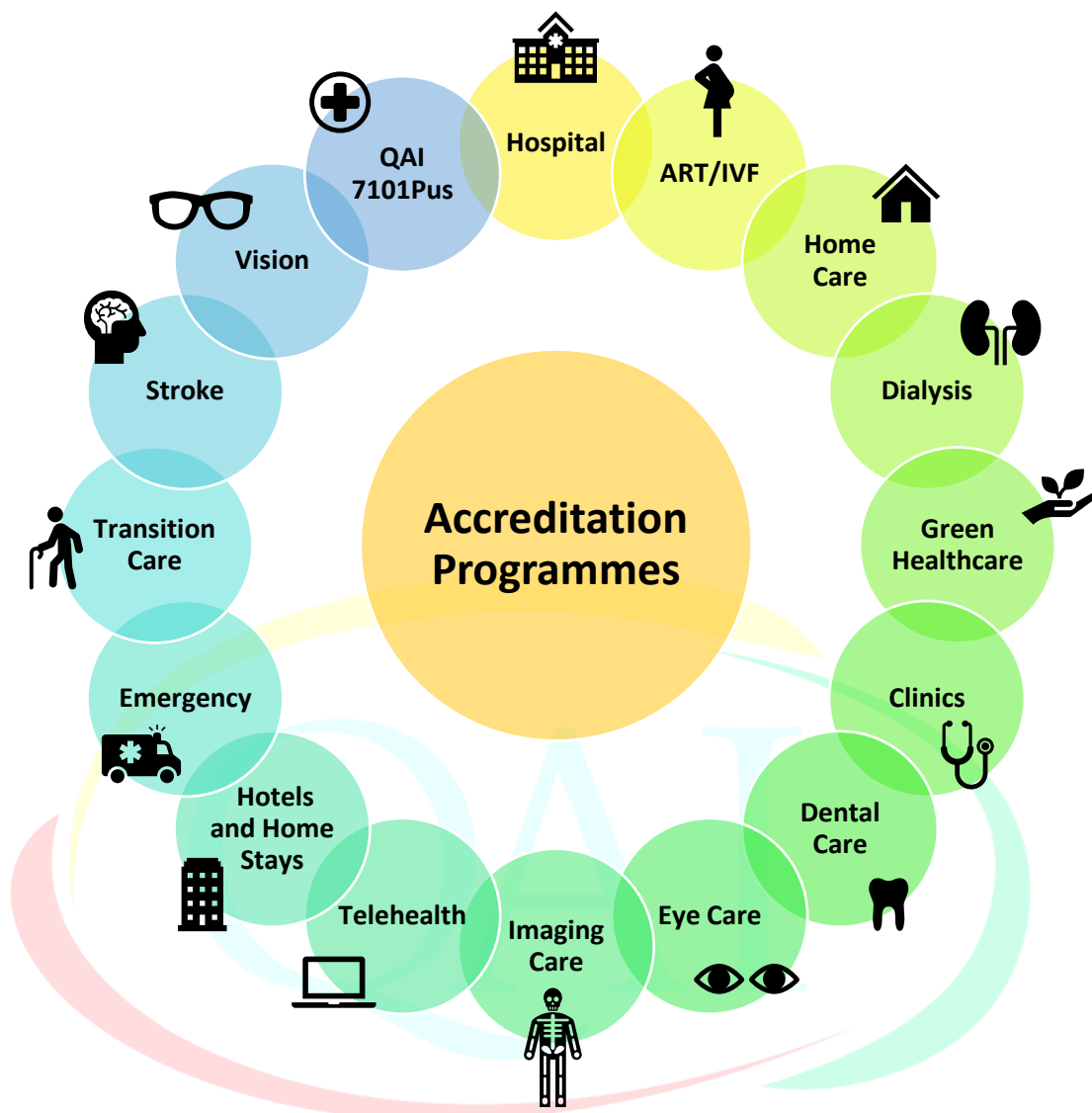
1. An operation theatre, also known as an operating room, is a specialised facility within a healthcare facility where surgical procedures are performed. OTs are equipped with surgical instruments, equipment, and medical devices, necessary for carrying out various surgical procedures safely and effectively. They are designed to provide safe and sterile environment to reduce the risks to the patient and healthcare providers.
2. Operation theatres in HCFs can be of two types -
 - (a) **Super specialty OT:** Operation theatres for super specialties like Neurosciences, Cardiothoracic, Transplant Surgery (Renal, Liver, heart, kidney etc.) etc.
 - (b) **Speciality OT:** This includes operation theatres for basic surgical disciplines like general surgery, Ophthalmology, Obstetrics and Gynaecology etc.
3. The HVAC requirements for OT are given below (ASHRAE Standard 170-2017).

| Requirements | Super specialty OT | Speciality OT |
|--------------------------------|---|--|
| Temperature (°C) | 18-24 | 20 – 24 |
| Relative Humidity (%) | 20 – 60 | 20 – 60 |
| Positive Pressure | Minimum 2.5 Pascal To be maintained 24 x 7 | Minimum 2.5 Pascal To be maintained 24 x 7 |
| HEPA Filters | MERV 7 + MERV 14 | MERV 7 + MERV 14 |
| Air Changes per hour | Minimum 20 out of which 4 shall be fresh air. Can be reduced to 25% during non-operating hours | Minimum 20 out of which 4 shall be fresh air. Can be reduced to 25% during non-operating hours |
| Supply Air Velocity | Unidirectional downward laminar air flow at 0.13 – 0.18 meter/second | Unidirectional downward laminar air flow at 0.13 – 0.18 meter/second. |
| Air quality | Air quality at the supply i.e. at grille level should be Class 100/ISO Class 5 (at rest condition). | The Air quality at the supply i.e. at grille level should be class 1000/ISO Class 6 (at rest condition). |
| AHUs | Independent AHU one per OT | Independent AHU one per OT |
| Use of Window / Split AC Units | Not permitted | |
| Location of outdoor air intake | Away from exhausts of DG Sets or other hospital areas | |
| HVAC Retrofitting | Direct Expansion AC units with AHU can be used but must meet all the above parameters are applicable | |
| OT Validation | As per ISO 14644:2015 (Cleanrooms and associated controlled environments) Once every 6 months. Parameters to be validated are – Temperature & RH, Temperature and Humidity, ISO Class 5 / 6 conformity, air changes, air velocity, pressure differentials, HEPA filter efficiency | |
| Maintenance | Once every month Cleaning of filters and preventive maintenance of AHUs | |

References:

1. HVAC Design Manual for hospitals and clinics 2nd edition, ASHRAE 2013.
2. Guide book for Healthcare Facilities (Heating, Ventilation and Air-Conditioning, Fire & Life Safety), 1st Edition, ISHRAE.
3. Gonzalo Sánchez-Barroso & Justo García Sanz-Calcedo, 2019. "**Evaluation of HVAC Design Parameters in High-Performance Hospital Operating Theatres,**" Sustainability, MDPI, vol. 11(5), pages 1-16, March. Accessed 20 May 2024.
4. CPWD design guidelines HVAC guide 2017 Ministry of Housing and Public Affairs New Delhi 2017.
5. NABH Revised guidelines for Air Conditioning in Operation Theatres (2018)





Quality and Accreditation Institute
Centre for Accreditation of Health & Social Care
709, Wave Silver Tower, Sector 18, Noida-201301, India
Email: info@qai.org.in Website: www.qai.org.in
M: +91 8287841146
Ph No.: [+91 120-6664981](tel:+911206664981)
[LinkedIn](#) | [Twitter](#) | [Facebook](#) | [YouTube](#) | [Instagram](#)