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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

JULY 2024

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

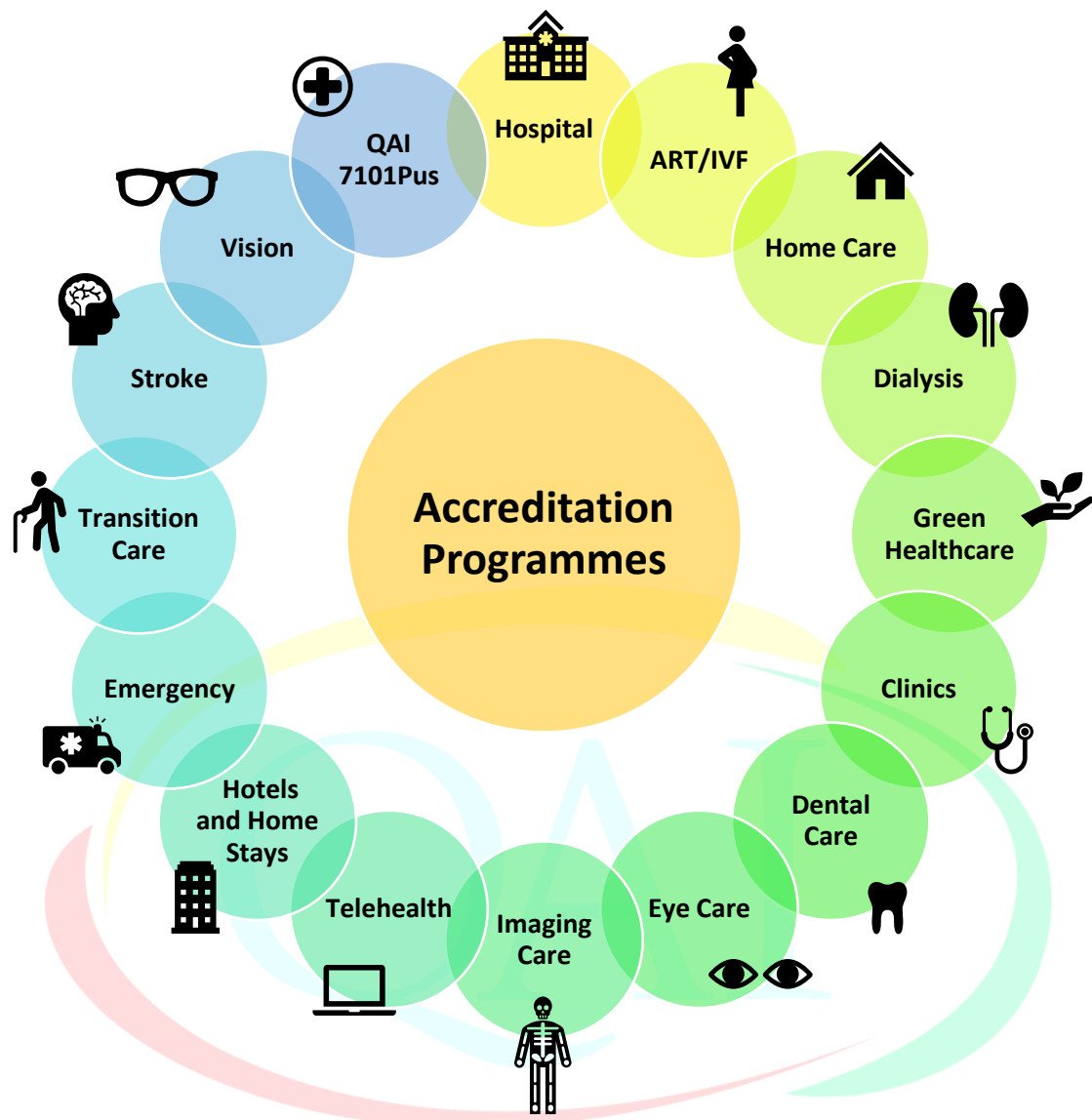
1. An operation theatre, also known as an operating room, is a specialised facility within a healthcare facility where surgical procedures are performed. OTs are equipped with surgical instruments, equipment, and medical devices, necessary for carrying out various surgical
2. procedures safely and effectively. They are designed to provide safe and sterile environment to reduce the risks to the patient and healthcare providers.
3. Operation theatres in HCFs can be of two types -
 - (a) **Super speciality OT:** Operation theatres for super specialities 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.
4. The HVAC requirements for OT are given below (ASHRAE Standard 170-2017).

Requirements	Super speciality 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)





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