

Strategic Planning and Designing of Contemporary Dental Clinic

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Abstract

In today's advancing times, the main reason we all want to have successful clinics is for a better future for ourselves and our families. It is especially important to understand the clinician's idea and the patient's idea of a clinic. A patient may want a clean, non-smelly, private chamber clinic whereas the clinician will want a more functionally stable, well-equipped operator. As for both the needs are different, yet we need to have a balance between the two and create an environment of equilibrium in our clinics. Thus, through this article, we wish to present few guidelines for designing a comfortable and functional dental clinic.

Keywords: Covid 19, Designing, Dental Clinic, Floor Plan, Planning, Vastu.

INTRODUCTION

A successful dental clinic designing requires a significant deal of meticulous planning and cautious execution to build, upgrade, or expand any dental practice. The approach should be realistic, and it is particularly important to achieve functional equilibrium among the principles of architectural design, clinical function, technology integration, and ergonomics. Essentially, all of these should be within the scope of one's budget.

In this article, the designing of a dental clinic as per the requirements in India will be discussed but this information can be used in general by anyone for the planning of a dental clinic both exteriorly and interiorly along with its Vastu, that is, "science of architecture." Today, Vastu also holds an important position while designing a dental clinic and could be integrated while planning the infrastructure.

FLOOR PLAN

Hence, the first question that arises is that how much space is required for a decent dental setup. In India, although there are no standardized dimensions specified about the total area required for a dental clinic but according to Indian demographics, an area ranging from 340 to 500 square feet is considered to be respectable enough to open a new dental chair clinic setup.^[1] This total area while designing a dental clinic

infrastructure can be divided into elementary and subsidiary rooms (Table 1).

Further in the article, each of these rooms' comprehensive planning will be discussed in detail. Starting with:

THE RECEPTION ROOM OR WAITING ROOM

It is the most primordial area for every patient as it is the first room that patients come into and passes their most anxious time waiting for the treatment. Hence, the waiting room should be inviting, that is, it should have well-lighted access with perimeter reception room seating. Individual seating should be preferred over sofa style seating. It should also have plants and pictures of natural scenes to give a soothing and relaxing environment to the atmosphere. This room should essentially have various amenities such as television, internet facility, air conditioners, outlets for chargers, and reading. Special attention should be given to the literature kept in the waiting area. It is recommended that instead of the dental magazine,

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there should be any other type of reading material which will help in reducing patient's anxiety waiting for the treatment as many of the patients of various age groups, especially children will be visiting a dental clinic for the 1st time in their life and for them enough resources should be present for their distraction from the noises of air rotor coming from the treatment room of the dentist and does not get discouraged for further appointments.

Another factor that can reduce the anxiety of the patient is the color of the walls. Usually, painted walls are inexpensive and easy to clean. Choice of color for the walls should be done very cautiously as colors such as green and blue are relaxing. Whereas colors such as red and yellow are warm and active. Thus, while painting the walls of this room, color shades, tints, tones, and neutrals should be used. If possible, color themes should be coordinated throughout the clinic. Using innovative ideas can assist in developing room atmospheres that are conducive to patient management. Today, a new technology in place of wall paints is also available such as wall coverings, or wallpapers, faux painting or a combination of paint and wallpaper.

Once the color of the walls is selected, it is important to coordinate the color of the floor with the color of the walls. For example, it is observed that a darker floor will give a dull appearance to a clinic whereas a bright-colored floor will give a brighter appearance to the clinic. There are various materials available for the flooring of a dental clinic, that is, they can be used in all elementary and subsidiary rooms. Each material is associated with its advantages and disadvantages (Carter and Carter, 2010) (Table 2).^[2]

Although among all the materials, linoleum is considered to be the best option for flooring of the dental clinic as it is most eco-friendly yet the limitations associated with it is that it is

expensive, so the reasonable option that is most commonly used for flooring material in India is ceramic tiles which are available in a wide range and various types. Furthermore, it is important to fill walls with display – bulletin boards, educational materials, and your achievements; this will help in educating your patients.

Next, the lighting of a dental clinic also plays a significant role. Therefore, it is advised that in a clinic, there should be indirect and yellow lighting which should be evenly distributed. It should be shadow free. LED lighting should be used which have good color rendering: Color Rendering Index no. 100 showing truer colors. As far as, possible natural light should be used because it gives a relaxing, softer, and stress-free atmosphere with more subtle environments.

According to Vastu^[3] of reception area, the main entrance should be in northeast, east, or north so that the consultation can be without fear and uncertainty. The waiting area should be in the northeast or north so that the patients do not feel agitated or disturbed.

CONSULTATION ROOM

Although it is a subsidiary component of a dental clinic, nowadays dentists with extra space are incorporating this area in their clinic because this area is primarily for two major reasons, that is, first as patient education and audiovisual center and second for few patient's privacy is necessary to discuss the patient's treatment and financial plans (sound insulated cubicle). According to Vastu,^[3] auspicious locations for the doctor are the south-west, south, and west.

WASHROOM/RESTROOMS

The color of the walls of this room should be white. Lighting should be done using cost-effective illuminated lights and flooring should be done using ceramic tiles and extended to the lower wall surface. According to Vastu (Jain, 2019), this room in the northwest direction is a favorable option.

TREATMENT ROOM

This room is the second most important place where the patient passes his most anxious time. Thus, it should be designed in such a way that its environment is relaxing while the patient is undergoing treatment.^[1]

Depending on the total floor area, this room can be designed as:

Table 1: Floor plan of a dental clinic

Components	Minimum space requirements
Elementary rooms	
1. Treatment room	9.3–14 Sq m (100–150 Sq ft)
2. Reception room	7.4–9.3 Sq m (80–100 Sq ft)
3. Sterilization room	3.7–5.6 Sq m (40–60 Sq ft)
4. Washroom	2.8–4.6 Sq m (30–50 Sq ft)
5. X-ray room	2.8–4.6 Sq m (30–50 Sq ft)
Subsidiary room	
1. Consultation room	5.6–7.4 Sq m (60–80 Sq ft)

Table 2: Different materials used in flooring of a dental clinic

Types	Durability	Maintenance	Esthetics	Cost	Disadvantage
Vinyl	High	Low	Wide range	High	Not sound proof
Linoleum	High	High	Wide range	Medium-high	Not sound proof
Sheet vinyl	High	High	Wide range	Reasonable	Limited style seams
Porcelain, ceramic, and stone	High	Low	Wide range	High	Dirty grout
Vinyl composition tile (VCT)	Low	Low	Multitude of color and pattern	Least expensive	Requires waxing

Small operatory

Consisting of a single room.

Large operatory

There are three types of treatment area concepts as follows:

Open bay

This type of setup is basically indicated in teaching institutions and hospitals and in this generally the dental chairs are placed at least 1.8 m (6 ft) apart (as measured from the center of the chair) (Figure 1). However, this setup is associated with no privacy for the patients during treatment and most chances of contamination.

Treatment room with partitions

One advantage of this type of operatory is that it maintains some privacy, that is, provides visual obstruction and if we change the orientation of chairs, it provides additional privacy to the patient. If the partition is incomplete, then the sounds cannot be contained.

The options for choice of material for partition can be glass which is a good option in terms of giving clean look, low cost, and ease of maintenance whereas if gypsum board is used, it helps in more sound absorption and more privacy to the patient.

Individual treatment rooms

These are self-contained units, with only one dental chair in each room, that is, individual treatment rooms. This type of operatory is ideal for the privacy of the patient and general or private clinic. For maximum efficiency, all treatment rooms should be the same in size, equipment, and layout. The major advantage of this type of operatory is that it provides no contamination at all.

The interiors of the individual treatment room with single chair, be it in a small clinic or large dental clinic, are as follows:

Ideal measurements are 11 feet 6 inches in length, 9 feet in width with a 9 feet ceiling height but if there is space constraint in width, then 6 inches can be added in length so that the dental assistant can walk around the patient at the toe end of the chair. Another option is by changing the angulation of the dental chair, that is, if the dental chair is angulated by 30°, the aisle increases by 23 cm (9 in) and if it is angulated by 45°, the aisle increases by 45 cm (18 in). This gives space large enough to position a wheelchair next to the dental chair. Another important consideration is that the dental assistants should sit slightly higher to allow for adequate vision. Be any kind of configuration, it is important to follow the ideal measurements for space requirements around a dental chair, that is, a distance of 2 feet should be present from the head of the dental chair to the wall and a distance of 1 foot should be present at the toe end of the chair^[6] (Figure 2). Dental chair can be installed in three different kinds of orientation as per the infrastructure of the room (Figure 3). The color of the walls should be calming such as taupe, brown, sage green, tan, or light yellows. The lighting should be concentrated at the patient's head consisting of illuminated white light and

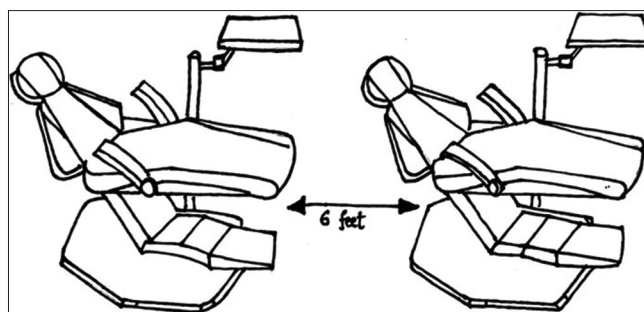


Figure 1: Ideal positioning of the dental chair in operatory

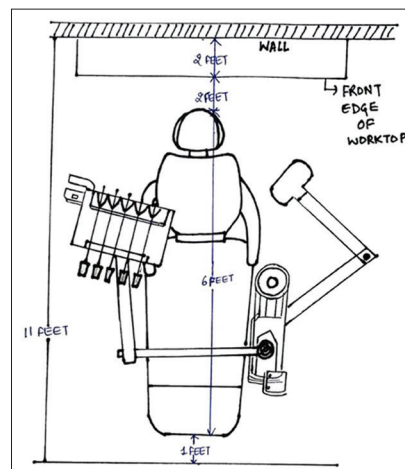


Figure 2: Ideal measurement of space requirement around the dental chair

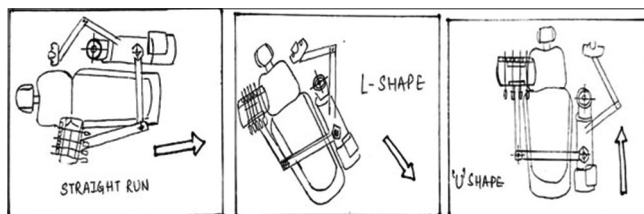


Figure 3: Three types of orientation of dental chair in an operatory

natural light for good visualization and the flooring should be done with the ceramic tiles.^[4] The ceiling's ideal height should be 9 feet high (avg.: 8 feet) because this gives a sense of openness, area for lighting fixtures. Nowadays, most of the dentist are including areas of interest on the ceiling which includes ceiling-mounted television screens, pictures of natural beauty, and colorful 3D paintings which help in the distraction of the patients while in the dental chair.

According to the Vastu,^[3] this room should be facing north-east when treating patients as it is considered to enhance concentration. Furthermore, the doctor's chair should not be black, gray, or blue. These colors are regarded as depressing and negative and should also be avoided on the floor.

The next essential and integral part of the operatory is the cabinets. They can be of various types: Portable dental cabinetry, stationary dental cabinetry, tall storage, or wall

cabinets. The standard height of the cabinet should be 90–95 cm (36–41 in) (Figure 4). The current trend for the position of the cabinet is at the 12 o'clock position with a support cabinet on the assistant's side. This position allows for ease of cleaning as well as prevention of accumulation of dust, mites, and termites in that area. The countertop material options^[5] are as follows:

Glass: Inert nature, low cost, as well as ease of maintenance. Non-absorbent, hygienic, and easy to clean.

Laminate: Resistant to stains, non-absorbent, hygienic product.

Formica: Hygienic, durable, non-porous, and resistant to heat and impact.

Corian: Non-absorbent and seamless.

Stainless steel: Easy to clean, non-absorbent, durable, and very modern looking but noisy.

Electrical and plumbing considerations

The plumbing services that are necessary to facilitate the operation are water, compressed air, suction, waste line, and electricity. A water pressure pump is useful to maintain the required pressure. Maintaining a natural slope for the outlet water lines is important. Electrical lines should run through the walls; make sure there are enough outlets for future needs.

Compressors and suction units

A small tip is that compressors and suction units should be placed in a separate mechanical room if possible. It gives a noise free and clean look to the operatory. The compressor and suction pipes should be under the floor, and half-inch copper pipes are preferred to prevent any leakage (Figure 5).

Entry and exit options (Figure 6)

When placing more than 1 doorway into the treatment rooms, there are three general options: the “H,” “U,” and “Y” configurations. The patient's entry into the treatment room should ideally not be placed facing the end (or foot) of the dental chair.

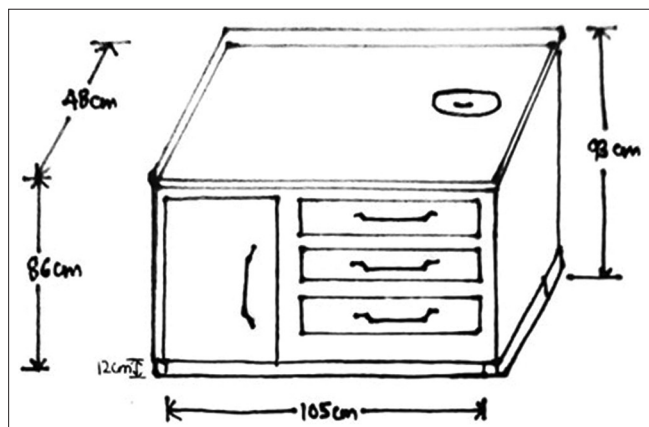


Figure 4: Recommended size in the cabinet

Sterilization room

A proper workflow should be present in a sterilization room (Figure 7). The workflow should be in one direction around the room to prevent clean instruments from becoming contaminated, that is, the reason is to create a “dirty” area and a separate “clean” area. Counter space: U-shaped surface, L-shaped surface, or straight run (Figure 8).

X-ray room

The ideal requirement during the construction of the X-ray room is that it should have a brick wall of about 12–15 cm

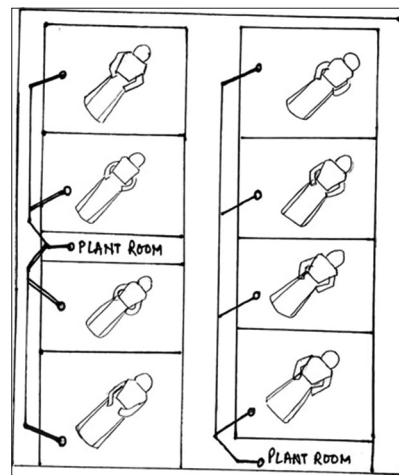


Figure 5: Underground suction pipe and separate compressor room in a multichair operatory

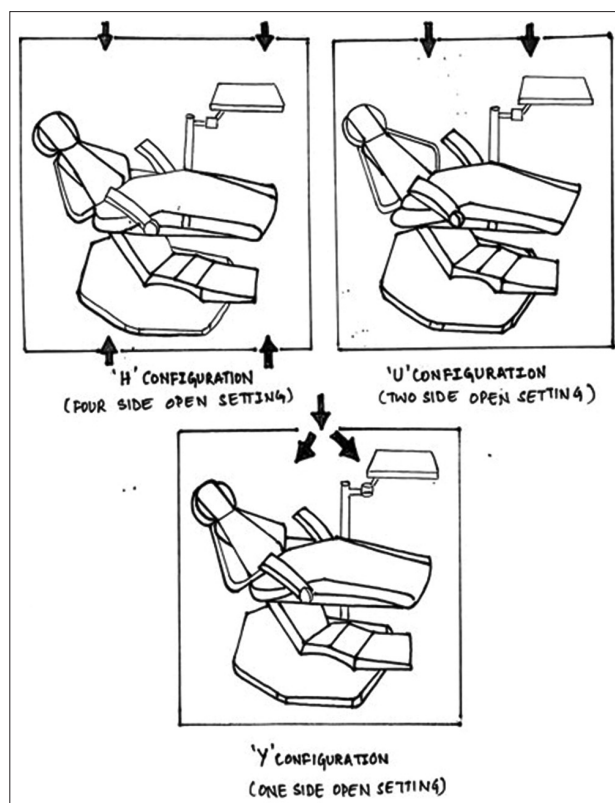


Figure 6: Entry and exit options in operatory

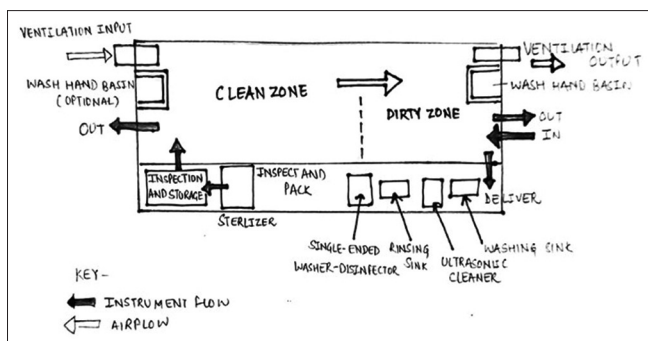


Figure 7: Sterilization room workflow

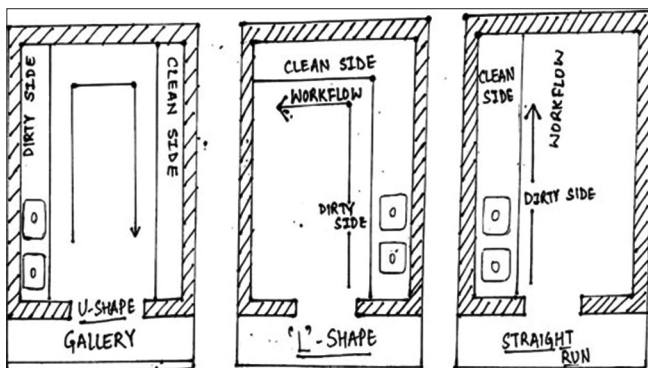


Figure 8: Three orientations of counter spaces in sterilization room

thick with a concrete wall of 8–12 cm thick. Shielding of the wall of X-ray room should be done with the lead equivalent of 1 mm. There should be a lead glass window between the operator and the X-ray tube. Distance between the X-ray table and control table should be kept between 10 ft and 15 ft. This room must have radiation warning signs on all doors. The color of the walls should be predominantly white. Use of cost-effective illuminated lights should be done. Flooring should be done with ceramic tiles till the lower wall surface. Ceramic tiles – durable, waterproof, stain, and water resistant. According to Vastu, the room should be in the south-east direction.^[6]

Finally, two elements that are quite important for a good and stress-free clinic environment are first incorporating nature in the interiors of a clinic as the presence of natural elements or even images make people feel relaxed. It is a highly effective method that has an analgesic effect and combat anxiety.

Another factor is soundproofing^[7] of the clinic which can be done by double wall construction in key areas, that is, waiting room and main office, acoustical material on ceilings, and weather stripping around doors.

Special precautions to be included in the infrastructure of dental clinic post-COVID-19 outbreak

At the entrance

- Installment of shoe cover machine or.
- Shoe stand to remove shoes or replace them with slippers provided at the clinic.

At the waiting area

- Front desk/staff should be separated from waiting room using transparent glass or barrier.
- Waiting area should be prepared in such a way that spacing for different patients can be maintained easily.
- Things that cannot be disinfected easily, such as magazines, reading materials, and other objects should not be kept on the table in the waiting area.
- Signages should be pasted in the dental office for instructing patients on standard recommendations for cough etiquette and social distancing.

Inside operatory

- Clinic should be kept well ventilated at all times,
- Keep the air conditioning vent facing upwards,
- Use of air purifiers with high-volume evacuator or high-efficiency particulate arrestor filters,
- If the dental chairs are not 6 feet apart, then two patients should not be treated at the same time.
- A study conducted by Ren *et al.*,^[8] reported that metals containing copper and its alloys have antiviral and antimicrobial properties and thus should be used for frequently touched surfaces such as door handles, countertops, and interior cladding material to inactivate the SARS-CoV-2. Copper alloy air vents or air conditioning ducts might be installed which can help in purifying circulating air while cooling it.
- Alteration in the installation of sinks and faucets should be done for minimal hand contact. Instead of traditional faucets, foot pedal or arm operated faucets should be fitted.
- Instead of cloth towels, paper towels should be used and auto-dispensing soap and sanitizer devices should be installed.^[9]

Separate room

- Separate places for wearing and discarding personal protective equipment (PPE) (closed rooms).
- Thoroughly disinfected scrub area with sink and long handle water outlet.
- Contactless bins for disposing of PPEs.
- Display charts or guidelines proposed by CDC or WHO for wearing and removing PPEs in their designated areas.

Implications for practice

- A functionally designed dental clinic is a mandatory requirement for both a new and established clinician.
- It also works as a valuable advertising instrument for dentist's practice.
- Integration of dentist's design ideas planned in association with qualified interior design professionals can help us to make planning decisions that can yield finest economical results.
- Efficient and effective dental clinic designing directly impacts productivity of the employees.
- Patients have many expectations before they walk through the door, so if they feel comfortable and experience

healthy clinic environment then they are more satisfied with the treatment.

- Dental clinic design reflects personal values as the owner whether he or she wants to practice a specialized practice or a general one.

CONCLUSION

Opening a dental clinic is not only a life changing turn in one's career but also a challenging one considering altering trends in dentistry, financial accessibility, and most prominently competitive market with more and more budding dentists around. In such scenario, it becomes vital to have complete overall considerations for designing and planning of a dental clinic, which includes objectivity, budget, and market conditions. Significance of good planning and designing dental spaces has increased, because over the past few years, it has been observed that there is a direct potential impression of medical spaces on patient psychological health. Thereby, making health-care interior designing to evolve dramatically over the past two decades.

Today, patients make judgments about the practice, its abilities, and competence based on what they see around them. Furthermore, the dental staff that works in the clinic everyday requires a carefully designed flow of the office furniture, the layout of patient treatment rooms, and private office space, thereby decreasing the workplace stress and promote an atmosphere of teamwork and collaboration. Therefore,

designing must be competently planned to find a purposeful balance between architectural design, technology, ergonomics, regulatory standards, and patient comfort.

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