Orthodontic office design: Principles and practice

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In this competitive world where each and every patient walking into your practice is precious, the first thing that the patient experiences is the orthodontic office design or setup. And this is something that has not been a part of our orthodontic training for all this while and given the least preference. It's time we look from the patient's perspective and make the entire orthodontic experience of the patient as memorable as possible, right from the first orthodontic consultation till the treatment ends. In this article, we have discussed key points to be considered while designing your orthodontic setup validated with a survey by the top architects in the world who are into designing orthodontic offices. (Semin Orthod 2016; 22:289–296.)

Introduction

Most orthodontists spend more than 50% of their waking hours in their offices.[1] It's therefore vital that the office be designed to make the hours spent there as pleasant, comfortable, productive and efficient as possible. The office should not only be a great place for you to be in, it should also be a great place for your staff and patients as well. Good design improves the working environment of any space and the orthodontic office is no exception. From the design of the ceiling and lighting to the flooring and traffic layout, many design decisions have to be made after careful application of the mind. Good design is an important investment in strategic thinking around any project. For your practice, design creates value in terms of competitive advantage, creation of customer loyalty, trust and market share.

Design can be a strategic asset when applied early on in the process of constructing an orthodontic office. When launching a professional practice, it is critical to consider and harness the power of branding. It is the quickest way for your practice to communicate to your patients who you are and what you offer, as well as set you apart from everybody else. With good design you can communicate clearly, ensuring that your mission is understood and your message heard. In a complex world where competition for time and attention is at an all-time high, good design will help you rise above the fray and achieve your goals, which in turn will help you build your practice.

The design process should be integrated at the beginning of creating a business or an office. Complete involvement of the orthodontist is imperative for successful design of the office. Good design has a vital role to play in communicating your mission and vision, and conveys your professional identity in an effective manner. Walking into a well-designed office creates an initial favorable impression to the patient which makes them more inclined towards starting treatment with you. Conversely, a poorly designed office will actually work against you, undermining your professional goals and objectives. As Steve Jobs, founder of Apple, Inc said: "Design is not just what it looks like and feels like. Design is how it works." In other words, excellent design not only looks great, but also works great.

Now, imagine this design-driven power applied to our orthodontic practices. Designing an orthodontic office is quite different from designing a general dental office. Before embarking on the design of the clinic, the doctor should be familiar with the legal and statutory requirements by various governmental agencies. For example, requirements for the installation of x-ray equipment vary from country to country. So do requirements for accessibility for differently-abled patients, as well as privacy of patients' individual information (e.g. HIPAA in the USA).

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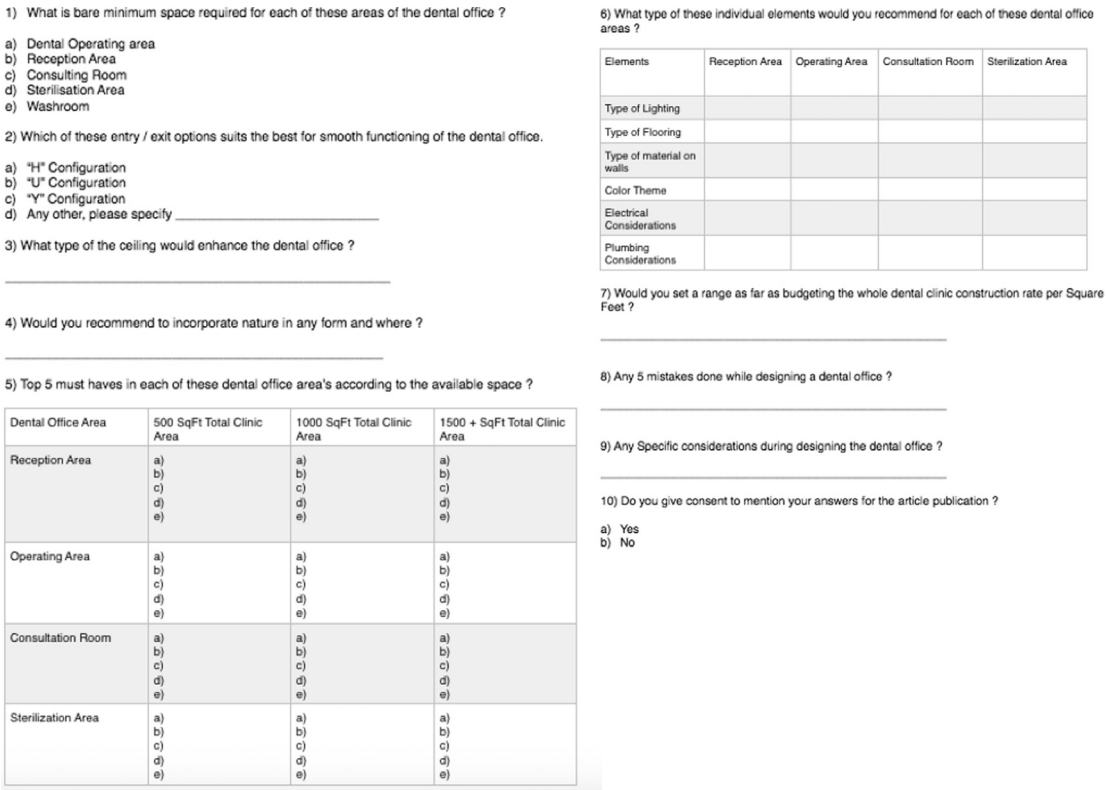
Our study

Global conditions and economical situations vary greatly from South-East-Asian countries to Western countries and European countries. With this in mind, we conducted a survey in which 20 of the top architects around the world who have been awarded for designing the best dental offices in the last two years were contacted and asked to fill in a questionnaire.[2] The data collection instrument was designed specifically for this project and was compiled by 10 orthodontists in private practice. Their comments regarding design, architecture, requirements and considerations during construction of the office were used to develop the final survey.

The final questionnaire consisted of office design and demographic analysis (Fig. 1). They were based on the architect's perspective on the various requirements in an orthodontic office. They were related to the space requirements, designs of individual orthodontic office areas, color themes, flooring, budgeting and any other necessary elements.

Ethical approval was obtained from the institutional review board of the Y.M.T Dental College & Hospital, Navi Mumbai, India for this project. The sampling frame consisted of the 20 architects around the world recognized by Dezeen, an architecture, interiors and design magazine, for constructing the best dental offices since 2013. These architects were from 11 different countries, adding value to the survey considering different practice trends in different parts of the world. E-mail addresses for the potential respondents were located by using Dezeen's online and printed directories. Emails were then sent describing the project, explaining the rights of research participants, and asking them to complete an online survey (Google Forms). Reminder e-mails were sent 1 and 2 weeks after the initial contact for a total of 3 electronic contacts. To maintain confidentiality, all electronic surveys were numerically coded, and participants were asked not to include any personal information on the survey. To prevent duplicate mailings, a linkage file was maintained by the primary investigator (J.V.) and destroyed



1) What is bare minimum space required for each of these areas of the dental office ?

a) Dental Operating area
b) Reception Area
c) Consulting Room
d) Sterilisation Area
e) Washroom

2) Which of these entry / exit options suits the best for smooth functioning of the dental office.

a) "H" Configuration
b) "U" Configuration
c) "Y" Configuration
d) Any other, please specify _____

3) What type of the ceiling would enhance the dental office ?

_____

4) Would you recommend to incorporate nature in any form and where ?

_____

5) Top 5 must haves in each of these dental office area's according to the available space ?

Dental Office Area	500 SqFt Total Clinic Area	1000 SqFt Total Clinic Area	1500 + SqFt Total Clinic Area
Reception Area	a) b) c) d) e)	a) b) c) d) e)	a) b) c) d) e)
Operating Area	a) b) c) d) e)	a) b) c) d) e)	a) b) c) d) e)
Consultation Room	a) b) c) d) e)	a) b) c) d) e)	a) b) c) d) e)
Sterilization Area	a) b) c) d) e)	a) b) c) d) e)	a) b) c) d) e)

6) What type of these individual elements would you recommend for each of these dental office areas ?

Elements	Reception Area	Operating Area	Consultation Room	Sterilization Area
Type of Lighting				
Type of Flooring				
Type of material on walls				
Color Theme				
Electrical Considerations				
Plumbing Considerations				

7) Would you set a range as far as budgeting the whole dental clinic construction rate per Square Feet ?

_____

8) Any 5 mistakes done while designing a dental office ?

_____

9) Any Specific considerations during designing the dental office ?

_____

10) Do you give consent to mention your answers for the article publication ?

a) Yes
b) No

Figure 1. Questionnaire for office design and demographic analysis.

at the end of the study. Respondents were excluded if they declined to complete the survey or if they did not respond within the given timeframe of 30 days.

The electronic surveys were downloaded from the Google Forms account. The overall response rate was 75% (15 responded out of 20) and the respondents to the survey represented all geographic regions. The responses of all questions were taken on averages and recommendations of majority of respondents on similar views were considered. The results of the survey are given along which each of the factors to be considered while designing an orthodontic office.

Components of the orthodontic office

The overall function of an orthodontic office should dictate the form of its design and layout rather than adapting function to a prearranged design. A new office, built from scratch, should have the interior functional layout designed before the other areas are designed and designated. Unfortunately, most offices do not have the luxury of flexibility in total size and shape determination, and remodeling an existing facility is the general norm.

A good way to start the process is to set goals and differentiate between the essential and non-essential components in the office as given in Table 1.

It is imperative to know your design goals before details can be implemented in an effective office layout by an architect. Similar to the design of a manufacturing facility, an orthodontic office should look at the production area (treatment rooms) and then the support areas for the treatment rooms and finish with the administrative and patient reception areas. For example, location, design, and space considerations could be planned in the following order as given in Table 2:

Table 1. Essential and Non-Essential Components in Orthodontic Office

Essential components	Non-essential/optional components
Reception/waiting area	Consulting room
Treatment/operating room	Multiple treatment rooms
Sterilization area	Separate laboratory/sterilization room
Consulting desk	Restroom
	Store
	X-ray room/photography room

Treatment rooms

The requirements for orthodontic treatment rooms vary from country to country. For example, most offices in Western countries have an open clinic layout for treating children and adolescents, with perhaps one or two rooms set aside for adults in a private or semi-private setting, while offices in much of the Middle East and Asia have only semi-private or private treatment rooms.

There are basically three types of treatment area concepts as follows:

(1) Open bay, (2) semi-private, and (3) individual treatment rooms.

Open-bay treatment rooms are common in orthodontic practices where there are severe constraints on space, in order to accommodate the maximum number of dental chairs. However, there is no privacy for the patients during treatment. These kinds of treatment areas are often seen in high-volume individual practices where adolescents are seen for short appointments, as well as in teaching institutions and hospitals. Generally, dental chairs are placed at least 1.8 m (6 ft) apart (as measured from the center of the chair).

Semi-private treatment rooms are used when one doctor intends to see more than one patient at a time while maintaining some privacy for the patient. There is some type of partition between the dental chairs to provide a visual obstruction. The orientation of the chairs can also be changed to provide additional privacy for the patient. However, because of the incomplete partitioning, the sounds of treatment and conversation cannot be contained. Glass is one of the most popular materials used for such partitions because of its clean look, low cost and ease of

Table 2. Space Requirement in Orthodontic Office

Components	*Minimum Space Required According to Architects*
Treatment room (each)	9.3–14 Sq m (100–150 Sq ft)
Reception/waiting room	7.4–9.3 Sq m (80–100 Sq ft)
Sterilization room	3.7–5.6 Sq m (40–60 Sq ft)
Consulting room	5.6–7.4 Sq m (60–80 Sq ft)
Washroom	2.8–4.6 Sq m (30–50 Sq ft)
Panoramic x-ray	2.8–4.6 Sq m (30–50 Sq ft)

maintenance. However, it is not as sound-absorbing as some of the other materials available such as gypsum board.

Individual treatment rooms are self-contained units, with only one dental chair in each room. They are ideal for the privacy of the patient and general clinic environment because of the containment of treatment sounds such as the whine of the dental turbine and ultrasonic scaler. In such cases, for maximum efficiency, all treatment rooms should be the same in size, equipment and layout. This will allow the doctor to perform any regular procedure in any treatment room. It will also prevent bunching of the appointment schedule around certain "preferred" treatment rooms or a delay in seating patients while a particular room is occupied or being prepared. It is also important to place the treatment rooms close to one another to facilitate easy movement of the doctor between rooms and to enhance productivity. Great care should be taken in planning the treatment room layout if more than four treatment rooms are designed, to ensure a smooth traffic pattern.

Another consideration is the entry and exit options for these treatment rooms. The patient's entry into the treatment room should ideally not be placed facing the end (or foot) of the dental chair. When placing more than one doorway into the treatment rooms, there are three general options: the "H," "U," and "Y" configurations (Fig 2). In the "H" design, four doors exist for each treatment room, two behind the patient and two at the foot of the chair. The "U" concept has both doorways behind the patient and eliminates the doorways at the foot of the chair. Patients and doctor come in through one entry and the staff enters through another. The "Y" design has one doorway on either the side behind the patient and one at the foot of the chair.

In the survey, the majority of the architects preferred either the "H" or "U" configuration.

The minimum space between two dental chairs in an open operatory should be 180 cm (6 ft) (Fig. 3). It is important that at least one treatment room be large enough to position a wheelchair next to the dental chair. Regardless of the treatment room design, the support equipment should be within easy reach of the dentist or the assistant. Dental assistants will need to sit slightly higher than the dentist to allow for adequate vision. Since the average reach radius of an assistant is approximately 66 cm (26 in), designs that bring in all work surfaces, materials, and instruments within this distance should be preferred. A general rule in dental office design is to have a minimum space of 76 cm (30 in) all around the chair for smooth traffic in the treatment room. In clinics with tight space constraints, to increase this space, if the dental chair is angulated by 30°, the aisle increases by 23 cm (9 in); and if angulated by 45°, the aisle increases by 45 cm (18 in).

Delivery systems can be behind the patient, beside the patient, or over the patient. While the final choice is usually up to personal preference of the orthodontist, it should function well in a properly designed treatment room. Ergonomics

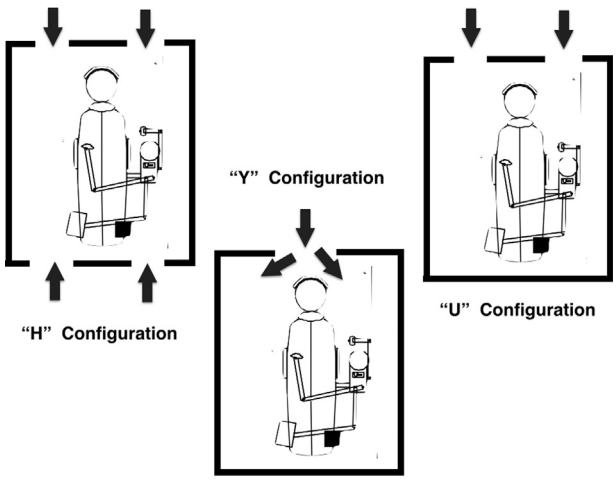


Figure 2. The "H," "U," and "Y" configurations.

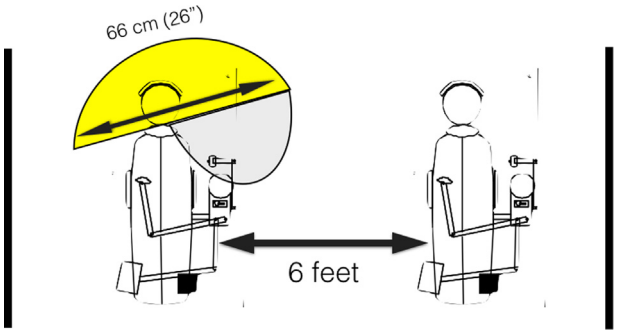


Figure 3. The positioning of dental chairs in orthodontic operatory.

should be taken into consideration while deciding on the position of the chair, area around the chair as well as the cabinetry for ease of functioning and to prevent unnecessary strain on the doctor and staff. Most standard dental chairs have an arm which crosses over the patient which has to be moved out of the way to allow seating and exit of the patient. This can be cumbersome and time-consuming in the orthodontic practice where most procedures are of short duration. These arms can be replaced with a trolley at the side of the chair, which allows easier seating and exit of the patient. There are companies which specialize in design and manufacturing such arm-less chairs and chair-side units and trolleys. Dental chair design is now moving toward elimination of the spittoon in favor of suction. Even the dental light can be independent of the chair. It may be on a floor-mounted arm or ceiling-mounted with a corded or cordless foot control for proper adjustment of the light. Since dental professionals are considered to be highly susceptible to back problems in the long term, it is advisable to consider using saddle-stools that helps the doctor maintain proper back posture while working on the patient.

Cabinetry must be carefully designed for function and efficiency. The standard height of the counter top is 90 cm (36 in). Glass is often used as the counter top because of it's inert nature, low cost as well as ease of maintenance. Many designers recommend off-the-wall cabinetry for the lower cabinetry because of elimination of a dead space of 15 cm (6 in) at the floor level. This allows for ease of cleaning as well as prevention of accumulation of dust, mites, and termites in that area. In case floor-mounted cabinetry is opted for, the lower area should be carefully sealed.

The most modern orthodontic offices are paperless. Provision should be made for locating the required number of computers, scanners, and networking equipment along with the necessary electrical outlets and hard-wired and wireless connections. The computer system should be designed taking into account security of the data and the possibility of a malicious incursion.

The planning and location of compressors and suction units are important when planning the clinic layout. They should be placed away from the treatment rooms, preferably in a separate mechanical room so that the sounds are contained. The compressor and suction pipes should be under the floor, and half inch copper pipes are preferred to prevent any leakage. If extra pipes and diverting knobs are added near the compressor for multi-chair orthodontic offices, it will be possible to shift the connection to the chair from one compressor to another in case of breakdown.

Electrical and plumbing considerations should be according to manufacturers' suggestions and operators' preference. Maintaining a natural slope for the outlet water lines is important. A water pressure pump is useful to maintain the required pressure. Electrical lines should run through the walls; make sure there are enough outlets for future needs.

Most of the architects who responded in the survey recommended some type of curves or areas of interest in the ceiling to provide the patient with some amount of distraction while in the dental chair. Many orthodontic offices now provide ceiling-mounted television screens and/

or headsets for patients. Nature is of extreme importance to an orthodontic office. Many studies have already confirmed that the presence of natural elements or even images of natural elements make people relax.

Some other key principles when designing a treatment room are as follows:

(1) never reduce or compress the floor space of a treatment room,
(2) if there are multiple treatment rooms: make them identical,
(3) Dental chair should be facing away from entry / exit, and
(4) Windows in the treatment room should preferably be north-facing, to avoid direct sunlight.

Reception/waiting room

Your reception area and the entrance to your office should reflect your personality. This is the area that should convey to your patients the surety that they have come to the right place. Subconsciously, patients are making value judgments about the office based on hundreds of little items they notice.

The reception area should be "inviting," with an open design that makes the patient feel at home. A minimum area of 60 square feet is required to accommodate 6–9 people. Individual seating is usually preferred over sofa style seating. Perimeter reception room seating is better in order to keep the entire area within the view of the receptionist.

According to our survey, the majority of the architects believed that the reception area is one of the most primordial areas in an orthodontic clinic because it is the place where the patients will spend time anxious for the treatment. This makes it the perfect place for architecture to try and soothe the patients' anxiety. Reception room design features such as ceiling height, doors, woodwork, lighting, and colors can all be used to set the tone for the patient visit. Interior designers can be extremely helpful in assisting the orthodontist to portray the desired "office image."

Some modern orthodontic offices have "treatment coordinators" or "greeters" who provide concierge type of services. Today, many dentists offer amenities such as juice bars, foot massager, and outlets for laptops, wifi, and computer-gaming equipment for children and entertainment systems designed to relax and occupy the patient before the appointment. Special attention should be given to literature placed in the waiting area, which should not be related to just orthodontics but various other interests like home decoration magazines, car magazines and comic books.

Consultation room

A good rule is to use at least 80 square feet for a business office. This room can double as a patient education and audiovisual center. An excellent room design would allow for ease of case presentation, adequate display aids, and the privacy necessary to discuss the patient's treatment and financial plans. Many orthodontists believe that presenting the case in such a setting will result in increased case acceptance.

In a large office, it is highly recommended that a separate sound-insulated cubicle be incorporated close to the reception area for discussions of financial arrangements as well as for conflict resolution.

A general guideline is that one person needs a two feet wide space to walk comfortably between objects such as a filling cabinet and a desk, so allow at least 5 ft for two people to work around each other without interference.[3]

Sterilization room

This is one of the most strategically placed areas in the orthodontic office, dictated by the function that is to take place there. It is a good idea to purchase the sterilization equipment such as autoclaves and ultrasonic cleaners early so that they can be built into the design. The sterilization area should have a soiled side and a clean side with a progression from one to the other. Logical placement of scrub sink, ultrasonic cleaners, and sterilization equipment indicates that the items for sterilization should progress through these steps and end up in a storage area for sterilized items. A minimum space of 60 square feet with 12–16ft of counter space for sterilization procedures would be ideal. Counter space in the sterilization area can be designed as an L-shaped surface, a U-shaped surface or as two parallel linear surfaces. The orthodontist will need to decide in advance

how extensive the in-office laboratory needs will be, and provide a separate area for that.

Lighting

Lighting is one of the mainstays of any architectural design and in an orthodontic office it can be used very well. Lights can build or break any environment. According to the survey conducted the suggestions made by the architects matched completely, which are given in Table 3.

Generally for the treatment room, ambient lighting should be evenly distributed, shadow free, have good color rendering and be concentrated at the patient's head. Lamps with a high Color Rendering Index (CRI) (a CRI number of 100 shows the "truer" colors) should be preferred. The position of these lights also plays a critical role.

Lately, the emphasis has been on the use of natural lighting and power-saving concepts. Interior designers have been using natural light and indirect lighting to produce a relaxing, stress-free atmosphere and softer, more subtle environments. The use of LED lighting has also brought about remarkable changes in terms of lighting in orthodontic offices.

Windows allowing natural light provide a psychological boost and a connection to nature, especially is plants and this another way of reducing stress.

Color

The healthcare industry is beginning to use more color, and orthodontic offices are following this trend. Interior designers can develop color themes throughout the office to attract the eye of the patient and assist movement through the office. Color themes for the floors, fixtures, equipment, walls, and ceilings should be coordinated, if possible. Using innovative ideas can assist in developing room atmospheres that are conducive to patient management. For example, use of color in corridors and stairways can provide stimulation and variety for patients who are passing between spaces.

There is evidence that suggests that certain colors are more relaxing than others.[3] It is important that the color schemes contribute to the overall relaxation of the patients in a dental office.

According to the survey conducted, white should be predominantly used along with one or two other light, sober and soothing colors to enhance the whole orthodontic office. In general, the colors used should be those of the practice logo and theme.

Table 3. Lighting Décor in Orthodontic Office.

Clinic Component	Type of Lights
Treatment room	Illuminated white lights Natural light
Reception area	Indirect lighting Yellow lights
Sterilization room	Cost effective illuminated lights

Flooring

The opinion of the majority of architects as far as flooring was concerned is given in Table 4.

Some basic rules to follow while deciding on the flooring: to avoid carpets anywhere in the orthodontic office and wooden flooring in the sterilization room or in the restroom. Flooring is also usually the first material to be decided and hence should match the color scheme accordingly.

Walls

Interior designers can assist you in planning your wall preparations keeping in mind the various requirements such as sound insulation. Painted walls are usually inexpensive and easy to clean. New technologies are producing wall-coverings or wallpapers with sharper and more sophisticated designs. Wallpaper is available in a wide variety of color combinations, designs, and textures. Also, these new products meet the fire code requirements. Faux painting is also becoming extremely popular. Consider a combination of paint and wallpaper in certain areas to enhance the office look.

Table 4. Flooring Options for Orthodontic Office

Clinic Component	Type of Flooring Material
Treatment room	Wooden or ceramic tiles
Reception area	Wooden, carpet, vinyl sheet, ceramic tiles, slate or a combination of all these.
Sterilization room	Ceramic tiles

Special considerations for orthodontic offices

While most of the principles for designing an orthodontic office are the same as those for a dental office, there are a few critical differences, which need to be kept in mind.

Primarily, a photography room/area for facial photography is required, since extra-oral and intra-oral photography is an integral part of our specialty throughout treatment. If there isn't enough space for a separate room, at least one corner with a plain background has to be dedicated where facial photographs of all patients are taken.

Secondly, a room for storage of records such as study models and radiographs is required for the orthodontic office. However, with the advent of digital scanners and digital models, this room is being done away with in new offices.

Thirdly, the reception area should be child-friendly, so that children can be kept entertained and occupied while waiting for their turn to be seen. Another important inclusion in multi-operator orthodontic offices should be a trolley in which certain materials are kept which cannot be in multiple numbers but may be required in any of the operatories in certain situations.[4,5]

Conclusion

There is no one ideal design to suit your needs. Your office should reflect your personality. An interior designer is good for making it look good: you need to give your inputs for better working convenience. Before designing an orthodontic office, do your homework.

As we concluded from the survey that a minimum of 46.5 Sq m (500 Sq ft) is required for an orthodontic office in which 9.3–14 Sq m (100–150 Sq ft) should be allotted to the treatment room. Important components to be incorporated such as lighting, flooring, color themes, electrical and plumbing options have to be carefully considered for proper and effective design of the orthodontic office. Finally, before designing your orthodontic office make it a point to visit other well-designed orthodontic offices and then try and adopt, adapt and innovate keeping these factors in mind and build your dream practice.

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