Design Challenge

RICHARD MITZMAN DESCRIBES HIS LATEST CONCEPT FOR PRACTICE DESIGN

The normal design for a dental surgery is to have glorified kitchen cabinets arranged in an L (Figure 1) or U (Figure 2) around the dental chair. The problem with this arrangement is that it soon becomes cluttered (Figure 3) and it is very difficult to clean and sterilise between patients. The drawers become filled with unnecessary instruments which are not sterile and gather dust. Dentists make 'nests' for themselves; collecting favourite things on their work surfaces making it difficult for someone else to use that surgery.

It is quite possible that the above arrangement could have been used indefinitely, but this was before AIDS and the increased need for cross infection control. It is essential to block every possible route for cross infection in any situation when there is treatment that involves bleeding – there is bleeding in every procedure in dentistry. Everything that the dentist and assistant touch has to be sterilised. This includes the dental chair, controls, light, suction, X-ray, all instruments and all work surfaces. Much of the ancillary equipment such as bibs, cups, salivary ejectors, head rest covers, three-in-one syringe tips and, of course, needles are disposable and need to be stored near the dental chair.

It is essential to remove all clutter and to reduce the work surfaces to a minimum so that it is possible to achieve an adequate level of sterilisation and hence, cross infection control. This would be difficult and time-consuming in traditional dental surgeries.

In a design proposal for the dental suite for Marks and Spencer's head office, I cut the two arms of the 'U' diagonally, forming two triangular arms, thus halving the work surface area. My reasoning was that the smaller the work surface, the less opportunity for clutter. I eventually removed these side arms altogether and used a single work surface at the head of the patient (Figure 4) and provided secondary work surfaces on mobile trolleys housed beneath.

My philosophy is to store nearly everything in the central sterilising area and as little as possible in the surgeries. I think it is totally unsuitable for dirty and contaminated instruments to be cleaned and sterilised in the surgery like the one illustrated in Figure 3, which

Figure 1: U-shaped set-up

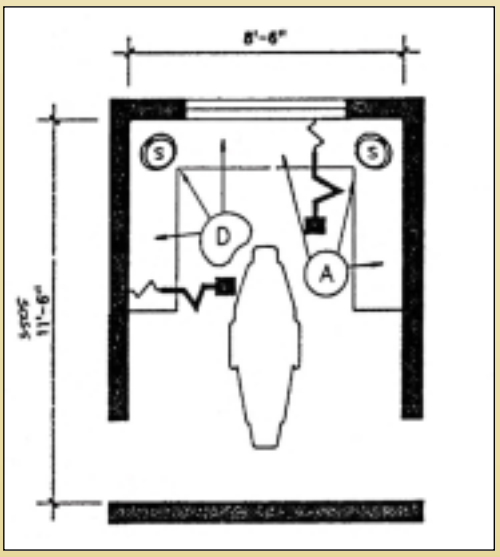

Figure 2: L-shaped set-up

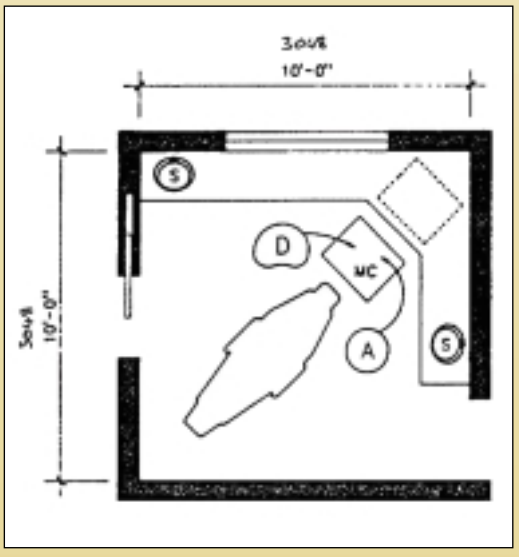

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Figure 3: A typical, cluttered dental surgery

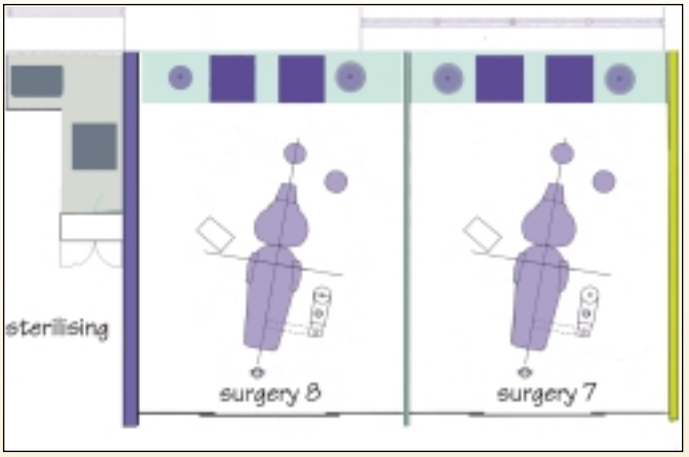


Figure 4: Rear worktop with mobile cabinets

Figure 5 (right): Weymouth Street sterilising area

incidentally is one of the newest surgeries of a dental corporate.

The process of sterilisation should be obvious to all the patients and so I like to raise the 'sterilising profile' of the practice and make the central sterilising areas as obvious as possible reassuring the patients. All such areas have purpose-made stainless steel work tops with integral seamless stainless steel sinks. The processing of contaminated instruments is designed into a productions line with newly bagged and sterilised instruments stored in glass-fronted double accessed cupboards which also house the supplies. The instruments are only opened in front of the patients as treatment commences. This removes any possible doubts about contamination that the patient may have.

In order to speed up the patient turnaround I always insist on twin dental surgeries (Figure 6) for each dentist so that they can go straight from a 'dirty' chair to a clean one without losing clinical time. The dirty surgery can be cleaned and sterilised while they are working on the next patient in the clean one. The surgeries should be as simple and uniform as possible so that any dentist can use them and no one surgery is preferred.

Figure 6 (right): Weymouth Street twin surgeries

This simple technique of eliminating the five or so minutes per patient that it takes for surgery turnaround, when one patient leaves, the next is seated and for the surgery to be sterilised, releases much of the stress on a busy practitioner. It also raises their net income by

TABLE 1: ACCUMULATION OF WASTED TIME

5 mins/patient	210 hours/year
12 patients/day	0.6 working days/week
1 hour wasted/day	4 working days/month
4.5 hours/week	28 full working days/year
18 hours/month	Over 6 working weeks/year

Figure 8: The computer can be read through the galss worktop

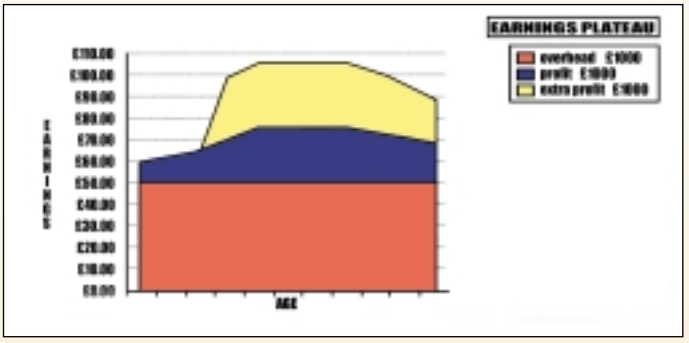


Figure 7: Raising one's earning plateau

at least 30% - this is because this wasted, stressful time adds up alarmingly and can total six working weeks per year (Table 1). This is just for that five-minute turnaround and also the time lost for other avoidable reasons such as incorrect bookings, missed or late appointments and inadequate treatment planning and appointment control. Since the practice overhead remains the same, the effect of eliminating these constant repeatable causes of lost time is to raise the practitioner's earning plateau and increase his net income considerably (Figure 7). Alternatively, if he feels that he is earning enough already, he can spend this time on the golf course, fishing or with his family, rather than waste it watching his surgery being sterilised.

Work surfaces should be as minimal as possible so that they do not invite clutter and can be wiped down quickly. It is important that the work surfaces can be 'seen to be clean' and for this reason I design and specify glass work tops (Figure 8). Disposables are stored in the trolleys garaged beneath these glass shelves which also serve as additional work surfaces.

Ideally, I would have liked to use glass cantilevered directly from the wall with no visible supporting structure. However, as the shelves are 500mm deep and up to 12m long, this would have been prohibitively expensive as 19mm glass would have had to be used.

I designed my first glass shelves for the Weymouth Street Children's Dental Clinic for Drs John Roberts and Brian Selwyn-Barnett. The shelves only had to support the sinks (which were stainless steel and very light) so that the supporting structure did not need to be substantial. As I had planned over 21m of glass shelving, the economic factors became paramount. I devised a system to support the glass that was economical and yet aesthetic. The design of these shelves and their supports was by far the most demanding aspect of the design process for the entire dental clinic.

I devised a system using cantilevered shelf brackets back to front (Figure 9). This was to limit the length of individual pieces of glass to 1500mm enabling us to use only 12mm thick glass as it is supported on three sides by a steel frame (Figure 10). This resulted in a

Figure 9: The design for the support structure

Figure 10: The support structure and the sink firttings

total cost for the 21m of glass shelves of less than £5000. The eventual result was more elegant than I had hoped, as the glass seems to float above its supports (Figure 11).

The total cost of the glass work tops, sinks and was under £10,000 for eight surgeries which is very cost-effective. They looked so functional and of a high standard yet cost no more than equipping only one surgery with the standard cabinets supplied by the dental companies. I used the same system for my next project - a NHS practice in a low-income area of Birmingham for Drs Steve and Jo Clements.

I then designed a private practice for the same clients in Sutton Coldfield, the budget was not so tight and I used 15mm glass supported on a metal angle fixed to the wall and a vertical 15mm glass support at the front of the shelf hiding the plumbing and the waste bin (Figure 12).

I used my system of storage walls (Figure 13) behind the glass shelf for the first time in the Birmingham practice. This houses all the services and the waste bin. There is also easily

Figure 11: The glass seems to float

Figure 12: Sutton - vertical glass support hides waste bin

Figure 13: Birmingham - storage wall and glass shelf

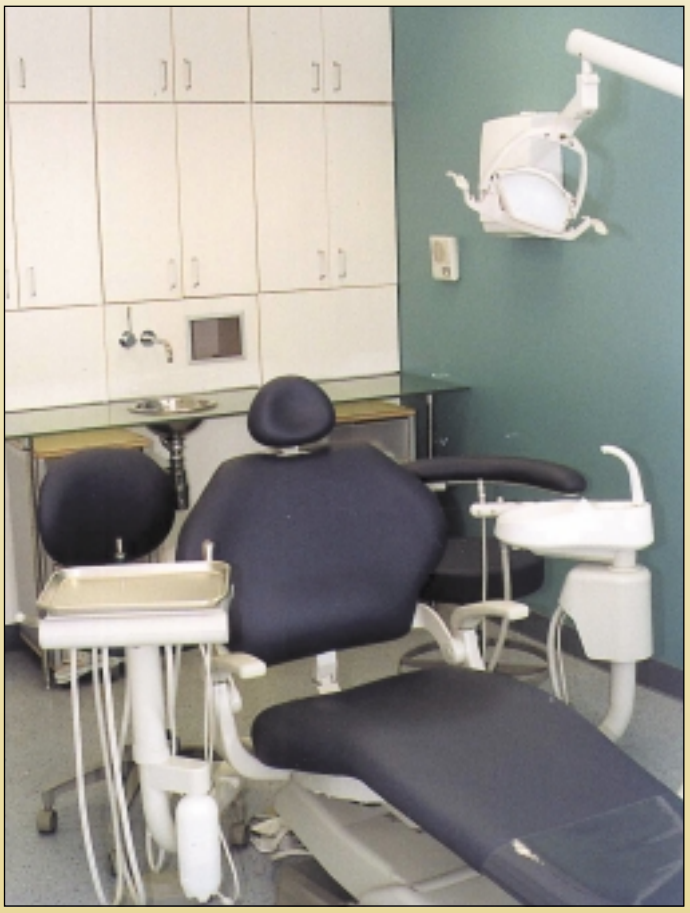


Figure 14: Birmingham - sterilising area

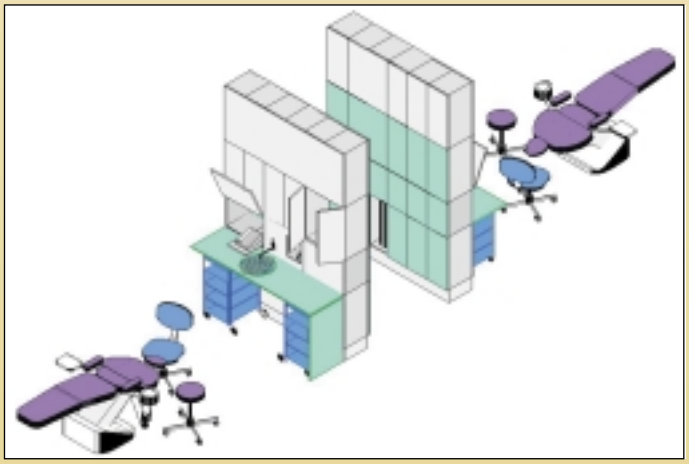
accessible storage for all the instruments and materials which is serviceable from the sterilising areas (Figure 14).

There is one complication regarding the double access storage walls (Figure 15) used in this way, as there were dental X-ray machines in every surgery, one side of the storage wall doors had to be radiopaque to conform with the regulations set up by the National Radiological Protection Board. This meant that these doors had to contain at least 1mm thickness of lead. The cupboards had steel and glass doors on the sterilising side and on the surgery side

Figure 15: Birmingham - access to storage walls

Figure 16 (left): Storage wall concept

Figure 17: Storage wall concept



were bespoke, made from MDF and laminate.

The 'splash back' cabinets (Figures 16 & 17) were fitted with up and over doors and a pull out shelf on which any electrical appliance be kept plugged in, hidden in readiness, with all the cabling run in the central services cupboard. The tap is fixed to the face of this cupboard as is the waste flap. A receptacle housing a standard yellow surgical waste bag lies below this flap, thus there is no surgically unclean waste bin in the surgery.

My designs for the recently-completed Harley Oral Reconstruction Centre for Dr Malcolm Shaller incorporates all the above features with a few additional refinements (due to the surgical nature of the work which requires even higher standards of sterility) and the highly technical nature of the practice (which is completely computerised to include digital radiography).

One step in the quest for cleanliness and sterility is the design for the mobile trolleys. What is particularly relevant are the polypropylene drawers which have rounded internal corners that don't trap dirt, the whole drawer being easily wipeable and cleansable. I designed the steel and glass trolleys (Figure 18), which were manufactured in Italy, to take these polypropylene drawers.

Another area of further refinement in the Harley Oral Reconstruction Centre was in the two surgical suites. The client particularly wanted

Figure 18: Impant clinic - storage walls, trolleys and pull-out computer drawer

'scrub-up sinks' (Figure 19) which were originally going to be in the sterilising area between the two suites but we ran out of room. The solution was to use 'above the counter' all-glass sinks so that splashing could be reduced. The sinks also added an extra 'wow' factor.

Figure 19: All glass scrub-up sink

The practice was completely computerised and this is a problem as far as cleanliness and sterility is concerned. The dental companies normally install computers complete with monitors, keyboard and mouse on trolleys to be kept next to the dental chair. We all know how filthy computers - especially the keyboard - get and they are quite unsuitable for a surgical environment.

My solution was firstly to house the CPU in the storage wall. There were monitors on each dental unit and a second monitor, mini-keyboard (with polythene cover) and mouse housed on a pull-out shelf in a splash back cupboard (Figure 20). In the surgical suites we used Wacom tablets with integral screens so that information could be accessed or inputted with a Wacom 'pen' that could be sheathed in polythene and thus be sterile so that no-one needs to 'unscrub' the computer. I believe

Figure 20 (below): Wacom tablet/screen

Figure 21: Consulting room

this is the first time this system has been specified for use during surgery.

I always design a suite for each dentist comprising at the minimum two identical surgeries, a central sterilising area and a consulting room (Figure 21). The latter is just as important as the surgeries as it can be a very productive area. All new patients are received here first, their histories taken and discussions regarding their problems and wishes can take place away from the dental chair. Subsequent presentations of treatment plans and fees can be held here in comfort and private. The dentist can also talk to his staff and take private phone calls here.

I try to design dual circulation for any practice (Figure 22) and also try to free the rooms from the constraints of the windows. If we were governed by these windows in setting out a practice we would usually have to accept fewer, larger rooms which would be unsuitable as dental surgeries. In a steel framed building such as in the Birmingham and Harley Street practices, we can remove most of the internal walls and have freedom in positioning all the rooms.

I planned the patient circulation around the perimeter of the buildings, alongside the windows (Figure 23), with the surgeries behind glass screens borrowing the light, which could penetrate deeper into the buildings. The central sterilising and storage areas, as well as the staff circulation, could then be behind the surgery storage walls in the centre of the practices. This increases the ergonomic efficiency of the practice as well as achieving a sense of calm. Light and translucency has been used to obtain a clean, bright non-threatening environment.

It is an innovative and state-of-the-art solution for any dental practice. ID

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Figure 22: Dual circulation - the window corridor is at the top

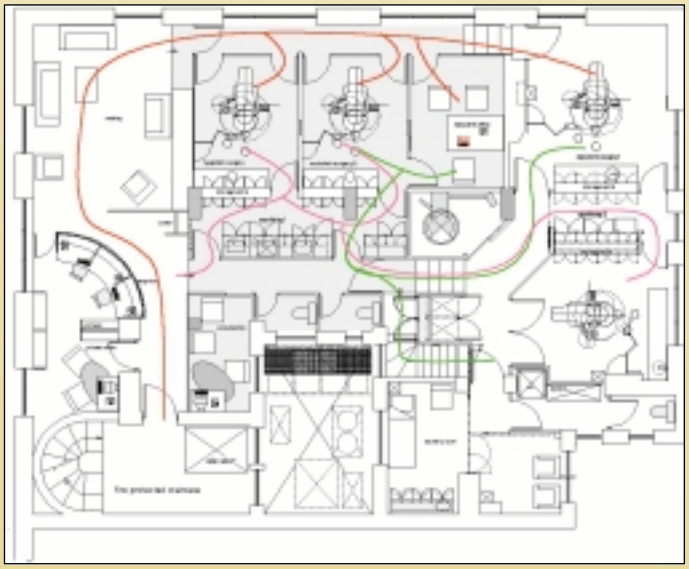

Figure 23: Window corridor