WHITEPAPER

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Factors to Consider when Specifying Flooring in Healthcare Environments

Polygiene
Safer to Touch

Flooring within healthcare facilities has to take into account a long list of complex considerations to meet the often conflicting demands of sanitation, construction, budget and aesthetics.

Hard, resilient and soft floor coverings all have a role to play within a hospital, however in many rooms particular coatings will be much more effective than others. From the reception rooms, surgeries and toilets to kitchens, chemical store rooms and back of house areas, it is important to analyse the levels of imperviousness, smoothness, slip-resistance, fire hazard properties and dirt control that is required within each setting to identify the ideal flooring solution.

Avoiding Surface Contamination

Designing effective infection control practises into the structure and daily operations of a healthcare facility is imperative. Floor finishes are an integral part of the overall infection control risk management strategy, as if not properly considered they can become a prime site of dangerous bacterial growth.

Analysing each area of a healthcare facility based on the likelihood of contamination and the risks that can stem from inadequate cleaning helps to focus attention on the key issues of hygiene at floor level in each area. The information gathered during this process can be used to guide flooring selection, to ensure that the most high risk areas are prioritised as the easiest to clean. This categorisation may need to change during outbreaks of disease, so bear in mind that the floor might need to withstand more intense cleaning during this time than would be the norm.

In Internal Floor Finishes in Healthcare Facilities by the Infrastructure Unit Support Systems (IUSS), which is a collaboration between multiple bodies including the National Department of Health and The Council for Scientific and Industrial Research (CSIR), floors need to be smooth and impervious to effectively resist the spread of infection are defined as needing to be. This is especially advisable in treatment rooms and any area where there is the likelihood of patient contact or spillages of blood and bodily fluids.

The hardwearing and gap-free nature of resin solutions fulfils these criteria, as the level, impermeable finish it creates will not harbour dirt and any contaminants can be quickly and easily removed from the area.

Polyurethane solutions can even be specified with antimicrobial additives incorporated within the system's resin matrix to actively target bacteria on the surface of the floor. The Flowfresh range achieves this by having the antimicrobial agent Polygiene® homogenously distributed throughout the finish, this additive uses natural silver ions to destroy bacteria on the surface of the floor.

Textile finishes may provide a more comforting environment than hard floor coatings, however they may be unsuitable for areas with a high soiling rate and that will require infection control management. Microbiological studies comparing patient rooms with and without carpets found higher microbial counts and more E. coli and other organisms on carpet samples than bare floors.

Significant sources of soiling to be aware of include foot traffic, incontinent patients, dropped food, liquids and gum. If such soiling is not quickly removed it will accelerate wear, with finishes that have a thin wear layer deteriorating especially quickly.

Skirtings and coving are an important aspect of the floor's design, as without it bacteria and pathogens can accumulate in the gap between the floor and wall. Skirtings in clinical areas should be high enough that damage from cleaning and wheeled equipment is reduced; the IUSS states that the height must be at least 150mm. In areas where damage to the wall may compromise infection control, such as in operating suites, the use of higher skirting or wall protection strips is advisable, while in non-clinical areas a minimum of 100mm is visually less institutional and should be suitable for most cleaning equipment. Coving created by running the floor system up the wall in one continuous flow can be used in all areas where hygiene and easy cleaning is vital, as it provides a smooth transition between horizontal and vertical surfaces.

Durability Factors

A hospital's on-site demands mean that the floors have to be able to cope with a long list of factors without becoming an unsightly and unhygienic surface. Not only does every area of the site need to be optimised for hygiene but the site's developers also need to consider the chemicals, heavy equipment, level of foot traffic and aesthetic demands of each part of the complex to ensure that the interior consistently meets these criteria.

Undertaking a thorough life cycle costing is essential to understand what the floor will need to withstand and how long you can expect it to last for, which are both important hygiene and budgetary concerns. By installing a thick, durable system with a higher initial cost, money can be saved in the long term by avoiding complex maintenance regimes, frequent repairs and early refurbishments as well as any compensation costs that stem from the inevitable organisational disruption of fixing a faulty finish. Instead the facility's floor budget can divide the cost of a more expensive but long-lasting floor into many years of reliable service.

Key factors to take into account during a life cycle costing include:

- The frequency, techniques and equipment to maintain the floor and if this is acceptable for the working hours (especially if 24/7).
- Monitoring to ensure the safe removal of contamination.
- Appropriate cleaning techniques that don't constitute an infection control risk.
- Disruption or disturbance caused to occupants and on-site activities.
- Patient population and their movement around the site. This includes the footwear they are likely to be wearing (heels for example).

- The high levels of friction created when moving heavy equipment (mobile x-ray units for example) or equipment which moves on certain wheel types can both damage unsuitable flooring.
- Disinfectants are a crucial part of any sanitation regime, the floor must be able to withstand frequent exposure to such chemicals.

Many healthcare facilities will have a mixture of interspersed room types, where this is the case it is beneficial to apply the finish that facilitates the most efficient overall maintenance regime to avoid a patchwork of different coatings and maintenance processes.

Health & Safety

Floor sanitation is not the only health and safety factor that needs to be considered when specifying flooring, as many aspects of a healthcare facility's daily operational activity can create slips, trips and falls (STFs), such as cleaning, spillages of water, blood and fluids, human movement using crutches or wheeled equipment and changes in the floor's level.

Floor finishes that enhance traction underfoot can be used in areas likely to constitute a STF risk. Healthcare sites can incorporate anti-slip aggregates into resin floor systems to provide extra grip underfoot. In areas where still water is likely to be present during normal daily operations and where standard footwear is being worn it is advisable to install a friction filled, non-profiled material with macro-roughness (roughness comprising an aggregate).

The slip resistance of a floor can be ascertained through tests such as the Wet Pendulum test to check that the finish meets the system's stated anti-slip properties. The floors non-slip potential should be checked over time, as wear, contamination and cleaning can all make a surface slipperier than it should be.

Effective drainage and the removal of water is not only important for sanitation, but it will also remove a dangerous slip hazard. Impermeable surfaces with coving make it easy to clear water, spillages and unwanted liquid out of the area before it can become either a hygiene or slip risk.

Bright, light reflective surfaces will help those moving around the site to see where they are going. This will also make any dropped contaminants easily visible, which will help pedestrians to avoid stepping in them and also helps staff to identify spots in need of cleaning.

Each person's cognitive senses, motor skills and personal situation can influence the risk of slips and falls. The most vulnerable groups include the aged, children and the disabled. Elderly people are at a particularly high-risk as any falls could cause further complications. Any change of floor

surface should be clearly identified to reduce the chance of tripping.

In acute mental health facilities and high security areas, a risk can arise if the floor finish is damaged, removed or misused, therefore tough floors that can avoid this situation from occurring are advantageous.

Colour & Demarcation

The colour and pattern of the floor should be carefully considered during the design stage, as they can provide healthcare facilities with practical and aesthetic benefits.

A bright, interesting and attractive interior that does not feel 'institutional' can help to create a calming environment that ultimately helps the healing process by reducing the patient's stress levels.

Decorative finishes don't just need to look good – but they've got to look good over long periods of time and despite the site's intensive, complex activities. Floors that reduce staining and marking will help to retain the intended feel-good effect of the floor.

Colours can also be used for functional purposes, such as by designating different zones and by creating navigational signage that helps patients find their way around the building and which also highlights to staff members the most efficient routes around the complex.

The same colours and patterns should not be applied across every department, for example a multi-tonal floor with shiny flakes in the finish might work for the reception, but in an operating room the floor needs a sharp visual contrast to allow for the easy identification of small dropped items. Inappropriate patterning can also create a risk for some patients by causing disorientation, dizziness and by impeding movement.
Some materials, particularly textile finishes, may

require early replacement due to deterioration in appearance before the end of their functional life. Compare the aesthetic potential of more robust flooring materials to determine if a similar appearance that lasts for a longer period of time can be attained.

Environmental Aspects

Indoor Air Quality (IAQ) can be significantly affected by the choice of flooring material. When sourcing the floor it is important to know if there are any chemical contaminants that could have a detrimental effect on the IAQ.

Volatile Organic Compounds (VOCs) are one of the main substances to be aware of, as while it is a popular construction ingredient, exposure to these compounds can constitute a significant health risk. To safeguard the air quality, floor products should be low-VOC emitting, non-toxic and chemically inert.

The Green Building Council of South Africa (GBCSA) awards points in the IEQ13 Category where interior finishes minimise the contribution and levels of VOCs in buildings, with reference to paints, adhesives/sealants and carpets/flooring.

Occupants with respiratory weaknesses such as asthma are most likely to be affected by VOC

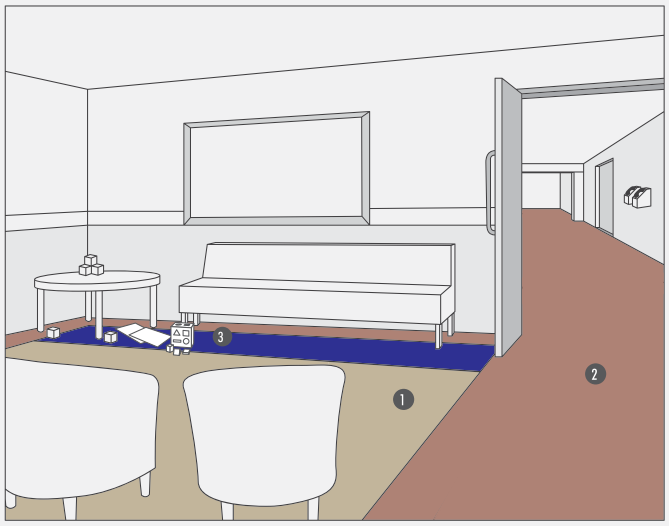

FIGURE 1: *Flooring Throughout the Hospital Environment*

emissions and high-risk patients need to be protected against materials that would worsen their condition. Unsanitary floor finishes that harbour bacteria, moulds and pollens can also have a detrimental IAQ effect.

Zoning and Fit for Purpose Floors

The IUSS recommends flooring properties for each department of a hospital and for each room likely to be found in that department.

Resin finishes are recommended as a useful solution that can be utilised across multiple parts of a healthcare facility, including storage areas, plant rooms, offices, rest rooms, kitchens, laboratories, laundries, dirty utility rooms, counselling rooms and waste disposal areas to name just a few. Specialist resin systems can also be specified for use in car parks and locations subject to exceptionally corrosive chemicals.

This functionality stems from the fact that these epoxy, polyurethane, methyl methacrylate and acrylic based floors can be installed in a variety of thicknesses to meet the on-site impact, traffic, chemical, temperature and hygiene concerns. Vinyl sheet is likewise identified as a resilient finish and has traditionally been one of the most popular flooring materials in healthcare facilities. The main argument against it is that it can create an institutional atmosphere that may undermine a calm, stress-free ambiance.

Both rubber and linoleum finishes can be used in similar locations to vinyl sheet thanks to the functionality that they can provide and the customisable options that are available. Linoleum however can deteriorate in areas with intensive cleaning and disinfecting regimes such as operating theatres and procedure rooms and it may not be suitable for places that require enhanced slip resistance.

Public areas that experience high levels of foot traffic can make use of terrazzo flooring systems that provide hard, durable, cost effective and easily cleanable surfaces.

Cementitious toppings are identified as ideal for fire stairs, walkways, general back of house and external areas. The slip resistance, porosity and hygienic credentials of this material can be tailored to meet the area's needs by adjusting the mix, admixtures, surface treatment and with an applied finish. This system can also easily be graded for drainage.

Soft textile finishes can be used in the most low-intensity areas, such as patient areas with a low soiling risk, staff meeting rooms and offices. Coatings like this such as carpets are good for creating a home-like environment, however they can quickly lose appearance quality when subject to high levels of public use and the microbial survival count is higher in carpet compared to smooth, impervious surfaces.

Specification Process

When going through the floor specification stage of any healthcare facility the architects and developers should consult the suppliers and manufacturers of the materials they are considering, to ascertain whether or not the systems will be able to meet the stringent infection control, aesthetic and longevity demands.

An unsuccessful design or the selection of a floor that is not 'fit for purpose' can result in costly and disruptive replacement work that can adversely affect the site's ability to maintain a sanitised and medically efficient facility.

Once the ideal solution has been chosen then the developer needs to ensure that a highly trained and licensed applicator is taken on to apply the coating, as even the most suitable material can quickly fail or disappoint if incorrectly installed.

The flooring manufacturer will also be able to supply the facility manager and cleaning

managers with an in-depth guide to how the floor should be maintained so as to get the best use out of it. Failing to properly follow this advice can lead to a number of floor failures, from unsanitary cracks and gaps to discolouration and poor slip resistance levels.

This guide has been produced to give an overview of floor specification considerations for healthcare facilities.

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