INTRODUCTION

The field of dentistry deals with the various nature of oral flora which is rich in various aerobic and anaerobic bacteria. Individuals undergoing treatment within the dental office could also be asymptomatic or could also be carriers of various diseases. The instruments utilized in medical also as dental field are contaminated with blood, body fluids etc during clinical procedures, which when cleaned, disinfected and sterilized by different methods will reduce the probabilities of infection between patient-dentist, dentist-patient and between patient-patient. The definition of Sterilisation states that it is a process wherein all sorts of microbial flora including bacterial spores are killed. Furthermore, it's a process by which a piece of writing, a surface or medium is freed from all micro-organisms either in vegetative or spore form. The definition of Disinfection states that it is a process wherein the pathogenic organisms, but not necessarily all the micro-organisms or spores are destroyed. Variety of sterilization methods are available for warmth tolerant dental instruments. These include use of steam struggling (steam autoclave), dry heat or unsaturated chemical vapour. Generally, the time duration of sterilization, its temperatures and other operating parameters should be followed as recommended by the equipment’s manufacturer. Additionally, instructions to be used of correct containers, wraps and chemical or biological indicators should be followed. Heat sterilization methods (steam autoclave, dry heat and unsaturated chemical vapor) are preferred for all equipment which will withstand high temperatures for several reasons. Liquid chemical disinfectants/sterilant should be used only heat will damage an item.

Infection control protocols include all the cleaning and sterilization of reusable dental instruments and devices. Care must be taken by the dental healthcare professional to make sure that each one instruments are cleaned before sterilization, which this is often administered during a safe manner to avoid injury and puncture wounds. The practices of sterilisation and dis-infection are the essential components of any infection control.
control programme during a healthcare setting. With the utilization of a contaminated device or instrument it can cause infection acquisition. Effective and efficient infection control within the dental office is important for the security of patients and to make sure that productivity doesn't suffer.\textsuperscript{7,8}

In addition, if adequate precautions are not taken, the dental office can potentially expose patients to cross contamination. As the understanding of this novel disease is evolving, it is important for the dental students and professionals to have an in-depth basic knowledge that should be reinforced and updated regarding the sterilisation and disinfection practices. Thus, this literature review was conducted to strengthen the fundamentals and protocols of sterilisation and disinfection for dental practitioners in current COVID-19 scenario and to assess the extent of monitoring of the same in dental office.

**Sterilization and Disinfection in Dental Clinics**

Primary goals of infection control in dental clinic are to lower the danger of contamination by reducing the extent of pathogens, to correct any break in aseptic technique, to use universal precautions with every patient (treat every patient and instrument as potentially infective) and to guard patients and personnel from occupational infection.\textsuperscript{9} Use of closed-system cassettes reduces the danger to dental healthcare professionals when executing infection control programs. Generally, while using sterilizers, washers and ultrasonic cleaners, it is mandatory to always follow the manufacturer’s instructions. It's also important to consult the manufacturer of dental instruments and devices as required to make sure complete sterilization and to avoid damage to those items.\textsuperscript{10} It is recommended that whone of the several tests are being performed for gaining assurance of complete sterility of the instrument’s and devices, Moreover, these tests must be performed on a routine basis to analyse that the sterilizer is working appropriately and sterilizing all instruments and devices which are then safe to be used on patients.\textsuperscript{11}

**Sterilization Methods**

**Steam Sterilization**

Among sterilization methods, steam sterilization is that the most generally used for wrapped and unwrapped critical and semi critical items that aren't sensitive to heat and moisture. When using an autoclave, the load must be placed in order that steam can circulate freely around each item, because steam must be ready to reach all instrument surfaces at a required temperature and pressure for a specified time so as to kill all microorganisms and achieve sterilization. make certain to follow the autoclave manufacturer's operating instructions\textsuperscript{12}

**Autoclave**

An autoclave may be a self-locking machine that sterilizes with steam struggling, achieved by the heat. Autoclaves are the universally accepted means for sterilization. it's generally accepted that an autoclave chamber must reach a minimum of 121°C at 15 Psi for a minimum of half-hour to make sure adequate sterilization. Sterilization time may vary counting on the number and density of things within the autoclave chamber. Overloading must be avoided.\textsuperscript{12}

**Dry Heat Sterilization**

Dry heat is employed to sterilize materials which may be damaged by moist heat (e.g. burs and certain orthodontic instruments). Although dry heat has the benefits of low operating costs and being non-corrosive, it's a protracted process and therefore the high temperatures required aren't suitable surely patient care items and devices with temperatures starting from 300 degrees F (149 degrees C) and upward are often used for sterilization. Dry heat sterilizers utilized in dentistry include static-air and forced-air types. The static-air type is usually called an oven-type sterilizer. The forced-air type is additionally referred to as a rapid heat transfer sterilizer. At a high velocity, the heated air is circulated through the chamber which permits more rapid transfer of energy from the air to the instruments and thus reduces the time needed for sterilization as compared to oven-type sterilizer.\textsuperscript{12}

**Unsaturated chemical vapour sterilization**

This method of sterilisation includes heating a chemical solution of primarily alcohol with formaldehyde under a pressurized chamber. This method of sterilization is ideally suited to steel instruments (e.g. dental burs) because the low level of water present during the cycle leads to less corrosion than could be expected with steam sterilization. Instruments must be dry before sterilization. Follow the manufacturer's instructions.\textsuperscript{12}

**Sterilization of Unwrapped Instruments**

An unwrapped sterilization cycle (sometimes called flash-sterilization) may be a method of sterilizing patient care items for immediate use. Using aseptic technique, the critical and semi-critical items that are sterilized unwrapped should be transferred immediately to the workplace or storage place. The unwrapped sterilization cycle in tabletop sterilizers is typically pre-programmed by the manufacturer to a selected time and temperature setting. Thorough cleaning and drying of instruments precede the unwrapped cycle. Mechanical monitors are checked and chemical indicators are used for every cycle\textsuperscript{12}

**Other Methods of Sterilization**

Other methods include liquid chemical germicides wherein, the heat-sensitive critical and semi critical instruments and devices are sterilized by immersing them in liquid chemical germicides. However, items sterilized during this manner can require approximately 12 hours of complete immersion. Moreover, these items sterilized during this manner must be rinsed with sterile water to get rid of any toxic or irritating residues, handled using sterile gloves and dried with sterile towels, delivered to the purpose of use in an aseptic manner then used immediately\textsuperscript{12}.

**Protocols of Sterilisation and Disinfection**

It is recommended that instruments that often penetrate oral soft tissue (the mucosa or skin) and even bone must be sterilized after each use or discarded. These things are termed critical items and have the best risk of transmitting infection, for e.g. surgical instruments, periodontal knives and scaling instruments.\textsuperscript{13} Instruments that aren't intended to penetrate oral soft tissues or bone (such as amalgam condensers, dental...
handpieces, mouth mirrors) but are available contact with mucous membranes or non-intact skin are termed semi critical items. These pose a lower risk of disease transmission; however, because the bulk of semicritical items in dentistry are heat tolerant, they also should be sterilized after each use. Reusable semi critical items unable to face up to heat (e.g. plastic impression trays, amalgam carriers, plastic instruments) should be processed with high-level disinfection. Non-critical patient-care items that are available contact with unbroken skin (e.g. radiograph head/cone, vital sign cuff, facebow, pulse oximeter) in many cases need cleaning, or if visibly soiled then cleaning followed by disinfection is adequate (low level disinfection). If a non-critical item is spattered with blood or touched with a contaminated glove or hand, it should be cleaned and disinfected. Non-critical items also can be protected with barriers. If contamination does occur, just remove the barrier and throw it away. Disinfection isn't necessary.

**Instrument and Area Sterilization**

The Instrument sterilization cycle begins with cleaning. Debris like blood or saliva must be completely far away from the instruments, since it prevents the sterilization agent (steam or unsaturated chemical vapour) from contacting the instrument surface to kill any micro-organisms present. The foremost common methods for cleaning instruments are the utilization of an ultrasonic cleaner or an automatic instrument washer. Hand scrubbing of instruments is discouraged since it presents a risk of injury to dental health care workers from punctures during handling and from spatter of debris from the instruments. The sterilization area is split into three zones which be due dirty to sterile.

The Dirty Zone: this is often where the used dental instruments are located. These instruments have potentially been exposed to blood or body fluids. Infectious waste containers also are found during this area.

The Disinfected Zone: this area is where items which have undergone a disinfection technique that kills most microorganisms are placed.

The Clean / Sterilized Zone: this is often where items that are through a sterilization process are kept and stored for future use.

The central processing areas ideally should be divided into a minimum of three areas: decontamination, packaging, and sterilization and storage. Physical barriers should separate the decontamination area from the opposite sections to contain contamination on used items.

**Monitoring of routine sterilization**

Monitoring of the sterilization process is important and significant to appropriately ensure that instruments and supplies are sterile when used. Sterilization procedures should be monitored using biological, mechanical, and chemical indicators. Procedures involved in administrative monitoring are decontaminating, terminally sterilizing, and cleaning all reusable items; removing disposable items, packaging and labelling of things, loading and unloading the sterilizer, operating the sterilizer, monitoring and maintaining records of every cycle, adhering to safety precautions and preventive maintenance protocol, storing of sterile items, handling sterile items ready to be used and making sterile transfer to a sterile field.

Regular sterilizer monitoring during a dental office, when properly implemented, is a crucial a part of infection control verification, and includes a mixture of process parameters to gauge the sterilizing conditions and therefore the sterilizer's effectiveness. Biological monitoring is that the standard for assuring proper sterilization of dental instruments. Both the Centre’s for Disease Control and Prevention (CDC) and American Dental Association (ADA) recommends that dental offices monitor sterilizers a minimum of weekly with biological indicators.

**Biological Indicators**—The standard for assuring proper sterilization of dental instruments is Biological monitoring. Biological test strips with non-pathogenic bacterial spores are placed within the sterilizer and processed with a traditional load. If a sterilizer is working properly, the spores shouldn't survive the sterilization process. To verify effective sterilization, the test strips are cultured to work out if the spores exhibit any growth. It's done by placing a test strip within the sterilizer consistent with the sterilizer manufacturer’s instructions. If there are not any instructions, a strip should be placed within a wrapped set of instruments within the most difficult area to be sterilized, normally the lower front area of the sterilizer. It's an honest practice to put the spore test strip during a different location of the sterilizer hebdomadally to assist identify any “cold spots” within the sterilizer. Positive assurance that sterilization conditions are achieved are often obtained only through a biologic control test. The biologic indicator detects non-sterilizing conditions within the sterilizer. A biologic indicator may be a preparation of living spores immune to the sterilizing agent. These are generally supplied during a self-contained systemin dry spore strips or discs in envelopes, or sealed vials or ampoules of spores to be sterilized and an impact that's not sterilized.

**Chemical indicators** — A chemical indicator on a package verifies exposure to a sterilization process. An indicator should be clearly visible on the surface of each on-site sterilized package. This helps differentiate sterilized from unsterilized items. Moreover, it helps in monitoring the various physical conditions within the sterilizer to alert personnel if the method has been inadequate. A chemical indicator can detect sterilizer malfunction or human error in packaging or loading the sterilizer. If a reaction on the indicator doesn't show expected results, the item shouldn't be used. Several sorts of chemical indicators are available: Tape, labels, and paper strips printed with an ink that changes colour when exposed to at least one or more process parameters.

**Physical indicators**—Various parameters which include cycle time, temperature, and pressure are evaluated by checking the gauges and displays on the sterilizer. Correct readings don’t verify sterilization, but incorrect readings can help identify a drag with the sterilization cycle.

**Maintenance of Infection Control**

Cross-infection generally refers to the transfer of disease from one patient to another within the dental clinic or hospital, whereas the transfer of disease to the dentist during dental treatment is taken into account an occupational exposure to a
given pathogen. Hence, the dentist must be learned about the diseases frequently encountered during care and must responsibly provide care to all or any patients without getting infected, or without infecting patients. Dental practitioners are exposed to a good sort of microorganisms within the blood and saliva of patients and these microorganisms may cause infectious diseases like a routine cold, pneumonia, tuberculosis, herpes, hepatitis B, AIDS, etc.26-28 The overall routes for transmission of microbial agents in practice are following because the direct contact with infectious lesions or infected saliva or blood; the indirect contact through the transfer of microorganisms through an infected intermediate object; the transmission mechanism of microorganisms or aerosolization; and spatter of blood, saliva, or nasopharyngeal secretions directly onto broken or intact skin or mucosa.29

CONCLUSION

Pervasive increases in serious transmissible diseases over the previous couple of decades have created global concern and impacted the treatment mode of all health care practitioners. Emphasis has now expanded to assuring and demonstrating to patients that they're well shielded from risks of communicable disease. Given the widespread transmission of SARS-CoV-2 and reports of its spread to health care providers, dental professionals are at high risk for nosocomial infection and can become potential carriers of the disease. In such situations, infection control has helped to allay concerns of the health care personnel and instil confidence and in providing a secure environment for both patient and personnel.

An understanding of sterilization and disinfection is important for all dental health professionals. It helps the health professionals to know the necessity for careful compliance with recommended infection control protocols. The last word objective is to guard the patients, professionals and para-professionals. It's necessary for every dental professional to conduct their practice during a manner that restricts the spread of infection and cross contamination. The current COVID-19 pandemic and also the increase in the incidence and prevalence of transmissible diseases like HIV/AIDS and hepatitis B and C makes it an absolute necessity to guard clinic staff and patients from cross contamination, using effective disinfection and sterilization techniques.

References

19. CDC. Recommended infection-control practices for dentistry, 1993. MMWR 1993;42(No. RR-8).


How to cite this article:

*******