

SJMLS - 7(2) - 008**An Assessment of Compliance with Infection Control Protocols amongst Dental Health Care Personnel in a Tertiary Health Facility in Southern Nigeria.**Mabiaku. Y.O.¹, Mabiaku T.O.²Department of Surgery, College of Health Sciences, Delta State University Abraka, Delta State Nigeria¹, Department of Family Medicine, College of Health Sciences, Delta State University Abraka, Delta State, Nigeria Delta State University Teaching Hospital, P.M.B, 07, Oghara, Nigeria².

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<https://dx.doi.org/10.4314/sokjmls.v7i2.8>**Abstract**

Dental practitioners are at a very high risk of cross infection due to multiple exposures with patients who may be asymptomatic carriers of infectious diseases. The study focused on Dental Health Care Personnel who are presently working in the Dental Centre of the University of Benin Teaching Hospital (UBTH) and it assessed the compliance to infection control practices. A self-administered questionnaire containing closed and open-ended questions was used. Information sought included; socio-demographic characteristics of respondents, duration as DHCP, knowledge of transmissible infections in dental clinics, level of compliance with infection control protocols and reasons for non-compliance. One hundred and thirty-five (135) Dental Health Care Personnel of the University of Benin Teaching Hospital were enrolled for this study. However, a total of one hundred and eleven questionnaires were properly filled and returned for analysis, giving a response rate of 82.2%. Fifty-two (46.8%) respondents, had good compliance, twelve (10.8%), had fair compliance and forty-seven (42.3%) had poor level of compliance. Although, the average level of compliance of the DHCP of UBTH was good, some basic important principles were not being observed. The study concludes in the affirmative that strict observance of standard infection control practices is possible.

Keywords: Infection control, Compliance, Dental Health Care Personnel.

Introduction

Infectious diseases are diseases or illnesses that occur in an individual or host organism as a result of the presence of a pathogen (viruses, bacteria,

fungi etc) or its toxic product which arises through transmission from an infected person, animal or a contaminated inanimate object to a susceptible host as defined by International Encyclopedia of Public Health (2017). Dental practitioners are at a very high risk of cross infection due to multiple exposures with patients who may be asymptomatic carriers of infectious diseases. The dental health care worker is faced with a greater risk of getting infected with HIV, HCV, following injuries at work (Molinari, 2000). The risk he is exposed to can be as high as ten times more than the common person not in the same condition (Rotter, 1996). Adequate compliance to infection control practices such as hand washing in between patients visits and avoidance of injuries from sharps can go a long way to prevent occupational exposure to infectious diseases. A study showed 80% of dental practitioners' harbors blood under the fingernails of index and thumb fingers for about one week (Verran *et al.*, 1996) This can become a reservoir for pathogenic organisms. The hands are one of the most important body parts involved in the control of infectious diseases because it is almost always the first means of contact between two individuals, and for dental surgeons, it is can be regarded as one of the most utilized tools in administration of treatment in patient management. It is obviously imperative to maintain meticulous adherence to proper methods of hand washing both for sterile procedures and non-sterile procedures as stipulated in most infection control manuals (Kohli and Puttaih, 2008; Dental Infection Control Guidelines, 2006).

Most clinical working environment are significantly contaminated by micro-organisms. Work surfaces such as the Dental chairs, the lamp holders, X-ray tube, tables and chairs etc can all act as fomites for transmission of infective agents. An Italian Dental clinic survey study, revealed a high level of air, water, and surface microbial contamination in the clinics especially during work hours (Sallisbury and Percival, 2019; Garner, 1996) The dental unit water supply is another very important source of infective organism in the dental clinic. Of particular interest are legionella, a pathogenic organism responsible for legionnaires disease, and pseudomonas another organism implicated in lung infections (Bolyard *et al.*, 1998). A study on the level of microbial contamination of the dental unit's water supply in some dental clinics in Italy reported 33% of the dental unit's water supplies, were positive for legionella specie during work hours (Greene, 1969). The American Dental Association has recommended that the CFU/ml (colony forming unit) of dental water be held at 200/ml in dental water, hence, the use of sterile water or biocides in dental practice is greatly advocated (Bolyard *et al.*, 1998).

Another very important aspect of infection control required for dental health care personnel is immunization against infectious conditions. Based on documented health-care –associated transmission of infectious conditions, the Advisory committee on immunization (ACIP), has recommended that, health care personnel (HCP) which includes DHCP, should be vaccinated against hepatitis B, influenza, measles, rubella and varicella (CDC, 2003). Since the early 1980's, occupational infections among HCP have declined because of vaccine use and adherence to universal precautions (Bell, 1997). In spite of the relevance of vaccination, many dental health care personnel are not vaccinated. A study in Jordan, reported that 95% of the dental staff had immunization for HBV, while 87% of the dental nurses were immunized (Polish *et al.*, 1993) Another study in Iran, showed a poor level of compliance to standard infection control precaution among dental professionals (Satori *et al.*, 1993). In a Canadian study on compliance to infection control practices, there was a very low level of

vaccination against HBV amongst Dentist in the country generally (Oosthuysen *et al.*, 2010; Macarthy and Macdonald, 1997). These are all pointers to the fact that Dental health care personnel seem to under rate the need for strict compliance with infection control practices. Also, the place of continued dental education cannot be over emphasized, because the zeal to follow strict adherence to infection control protocols may wean over the years of practice. An evaluation study between General Dental Surgeons and Oral Specialist in Turkey, revealed a lack of interest in infection control issues as well as a gap in practice between knowledge and compliance knowledge among dental professionals in both groups who were ten years and above in practice (Sartori *et al.*, 1993).

A systematic review of available literature on the adherence of South African oral health care professionals to infection control recommendation between 1990-2007, focused on nine areas with regard to infection control practices. It also reported a serious shortcoming with regard to infection control practices in oral health care facilities in South Africa (Olulola-sofola, 2003). A preliminary study on the compliance of Nigerian dentist with infection control protocols in public Hospitals, carried out in Lagos state in 2003 reported a fair compliance in some control protocols, and a poor compliance in others. The study revealed the need for continued dental education in infection control and a dire need for proper funding and updating of Hospital equipment in health facilities (Bancescu *et al.*, 1999). An assessment of infection control practices in dental clinics in Romania (both private and public clinics), reported a fair compliance with infection control practices in most of the clinics when compared with their national infection control standard. Results indicated that gowns were universally worn, but use of gloves, masks and protective eye-wear showed non-compliance with less than 10 per cent of the offices using personal protective equipment for all patients. Cost was the deciding factor (Siew *et al.*, 1995).

Dental hygienists and Dental assistants both play a vital role in the prevention of disease transmission in the dental office. In a study

carried out in Rhodes Island among Registered Dental Hygienist (RDH) and Certified Dental Assistant (CDA), most responding RDHs and CDAs were wearing gloves but substantially fewer were utilizing one of the two acceptable combinations of personal protective barriers. Although the majority of both groups reported having attended an infection control course within the past year and have written infection control protocols in place, many recommended procedures were not practiced routinely (Araoye, 2004). It is logical to wonder why there would be non-compliance to safety rules by a health care worker who is well informed and claims to be satisfied with the level of information had and yet not comply with them. A close assessment of different scenarios points out varying probable factors that are responsible for non-compliance. In a study carried out in Sudan, economic status was a very important factor (Chechil and Samaritani, 2005) and another study done in University College Hospital Ibadan, to evaluate basic routines in prevention of cross-infection in the Dental clinics among 77 dental healthcare workers reported inadequate number of dental surgery assistants, faulty sterilizing equipment, poor monitoring of sterilization, coupled with inadequate number of instruments as factors contributing to the poor instrument processing procedures. The study reported that successful infection control in the dental clinic was highly dependent on the dental surgery assistants and concluded that the hospital management was pivotal in getting the required number of physical and human resources available and in the overall surveillance of nosocomial infections (Decreane *et al.*, 2008).

Materials and Methods

Study design and Instrumentation

It was a descriptive cross-sectional study that was carried out in the Dental Centre of the University of Benin Teaching Hospital (UBTH) between 2011-2013. Ethical approval was granted by the Ethics and Research Committee of the hospital (ADM/E22A/A/VOL. VII/950). The study population was made up of all dental healthcare personnel of the dental centre of the University of Benin Teaching Hospital. A total of 100 Persons was selected from 135 individuals, given a sampling fraction of 74%. Considering

attrition, the sampling fraction was increased to 84%, a minimum of 110 respondents was enrolled for the study. A total population survey sampling technique was employed, because the calculated sample size was 110 out of a total population of 135.

Inclusion Criteria: All Dental Health Care Personnel (DHCP) who have worked for not less than six months.

Exclusion Criteria: All Dental Health Care Personnel who have not worked for up to six months, all temporary DHCP staff and DHCP who choose not to consent to participate in the study.

Data Collection: The instrument that was used was a self-administered questionnaire containing closed and open-ended questions. Information; socio-demographic characteristics of respondents, duration as DHCP, knowledge of transmissible infections in dental clinics, level of compliance with infection control protocols and reasons for non-compliance. It was in four sections ABCD. Research assistants were final year dental students on clinical posting and house officers. These were recruited to assist in administering the questionnaire after a period of training and standardization of instrument. **Section A:** Socio-demographic characteristics of the staff. **Section B:** Assessment of level of compliance to infection control protocols. **Section C:** Assessment of Reasons for non-compliance where applicable. **Section D:** Suggestions.

DATA MANAGEMENT

Measurements of Variables. 1) Assessment of compliance: The total compliance score was 15. For every correct practice a score of one [1], was awarded, while the wrong practices earned no scores. All scores above the mean scores of the population was rated as good, all those equal to the mean were rated fair/moderate, while those below the mean were rated as poor.

Statistical Analysis

Data was collated and entered into the SPSS spreadsheet. Results were presented as tables and charts where appropriate. The computer software, Statistical Package for Social Sciences

(SPSS) Version 16 was used to analyze the Data. Chi-square test of association was used to determine level of association between the level of knowledge and compliance of DHCP's with infection control protocols.

Ethical Consideration

The proposal was submitted to the Ethics and Research Committee of the tertiary health institution for approval of the study. Verbal informed consent was obtained from all respondents in the study. All respondents were assured of confidentiality in the study.

Limitations of The Study

The findings in this study were based on self-reporting, which may have biased the results.

Results

One hundred and thirty-five (135) Dental Health Care Personnel of the University of Benin Teaching Hospital were enrolled for this study, however, a total of one hundred and one questionnaires were properly filled and returned for analysis, giving a response rate of 82.2%. The Dental Surgeons (Dentist).

Table 1: Level of Compliance with infection control protocols

| Level of compliance | Frequency | Percent |
|---------------------|------------|--------------|
| Good | 52 | 46.8 |
| Fair | 12 | 10.8 |
| Poor | 47 | 42.3 |
| Total | 111 | 100.0 |

Fifty-two (46.8%) respondents, had good compliance, twelve (10.8%), had fair compliance and forty-seven (42.3%) had poor level of compliance.

Table 2: Profession of Respondents versus Level of Compliance with infection control protocols.

| Profession of respondents | Assessment of Compliance | | | Fisher's Exact Test | P. value |
|---------------------------|--------------------------|-------------------|-------------------|---------------------|----------|
| | Good | Fair | Poor | | |
| Dentist | 31 (59.6) | 8 (66.7) | 36 (76.6) | 11.891 | 0.199 |
| Dental hygienist | 0 (.0) | 0 (.0) | 2 (4.3) | | |
| Dental nurse | 7 (13.5) | 2 (16.7) | 3 (6.4) | | |
| Dental lab technologist | 1 (1.9) | 0 (.0) | 2 (4.3) | | |
| Dental student | 8 (15.4) | 1 (8.3) | 4 (8.5) | | |
| Dental student nurse | 5 (9.6) | 1 (8.3) | 0 (.0) | | |
| Total | 52 (100.0) | 12 (100.0) | 47 (100.0) | | |

Professional groups and their level of compliance with standard infection control practices. The table demonstrates a lack of significance in the relationship, p=0.199. This means that the compliance level demonstrated is not a factor of the group the respondent belongs to.

Table 3: Compliance with infection control practices

| Infection control practices | Response | | Total n (%) |
|--|-----------|------------|-------------|
| | No n (%) | Yes n (%) | |
| Wear gloves | 8 (7.2) | 103 (92.8) | 111 (100) |
| Wear gloves before | 58 (52.3) | 53 (47.7) | 111 (100) |
| Wear gloves after | 18 (16.2) | 93 (83.8) | 111 (100) |
| Wear goggles | 83 (74.8) | 28 (25.2) | 111 (100) |
| Wear face mask | 29 (26.1) | 82 (73.9) | 111 (100) |
| Change facemask | 43 (38.7) | 68 (61.3) | 111 (100) |
| Autoclaving hand pieces | 75 (67.8) | 36 (32.4) | 111 (100) |
| Use of rubber dam for isolation | 97 (87.4) | 14 (12.6) | 111 (100) |
| Routine use of suction | 87 (78.4) | 24 (21.6) | 111 (100) |
| Temperature regulation for sterilization | 49 (44.1) | 62 (55.9) | 111 (100) |
| Disposal of sharps | 33 (29.7) | 78 (70.3) | 111 (100) |
| Disinfection of impression | 50 (45.0) | 61 (55.0) | 111 (100) |
| Disinfection of prosthesis | 54 (48.6) | 57 (51.4) | 111 (100) |

This table shows some specific routine practices that make up the standard infection control protocols expected in Dentistry. Almost all of the respondents utilize gloves routinely in caring out their duties; one hundred and three (92%), but less respondents practiced routine hand washing before wearing gloves 53(47.7%), while 93(83.8%) washed hands after degloving. The use of goggles was poorly practiced routinely: 28(25.2%). Facemask were routinely utilized by 82(73.9%) respondents, whereas, only 68(61.3%) changed them in between patients care. Autoclaving of Handpieces in between patient was practiced by 36(32.4%) respondents, only 14(12.6%) routinely utilized rubber dam for isolation. Twenty-four (21.4%) respondents used suction for evacuation of saliva. The sterilization of instruments at the right temperature was affirmed by sixty-two (55.9%) respondents, disposal of sharps into the yellow bin was practiced by sixty-one (55.9%) respondents. Disinfection of impressions in the clinics before being sent to the laboratory and disinfection of prosthesis coming from the laboratory before being delivered to the patient is routinely practiced by sixty-one (55.0%), and fifty-seven (51.4%) respondents, respectively.

Table 4: Reasons for non-compliance with infection control protocols.

| Reasons | Response | | Total n (%) |
|------------------------|-------------|--------------|----------------|
| | No n (%) | Yes n (%) | |
| Inadequate instruments | 61 (55.0) | 50 (45.0) | 111 (100) |
| Staff | 83 (74.8) | 28 (25.2) | 111 (100) |
| Equipment | 75 (67.6) | 36 (32.4) | 111 (100) |
| Negligence | 91 (82.0) | 20 (18.0) | 111 (100) |
| Ignorance | 91 (82.0) | 20 (18.0) | 111 (100) |

Various reasons for non-compliance were suggested by the respondents. The lack of adequate instruments and materials ranked the highest 50(45.0%), next was the lack of adequate and current standard equipment 36(32.4%), inadequate staff strength especially in the group of dental nurses was next 28(25.2%), a negligent attitude towards compliance with standard infection control practice as well as the ignorance of some of the principles of standard infection control, ranked the least 20(18.%) and 20(18%) respectively.

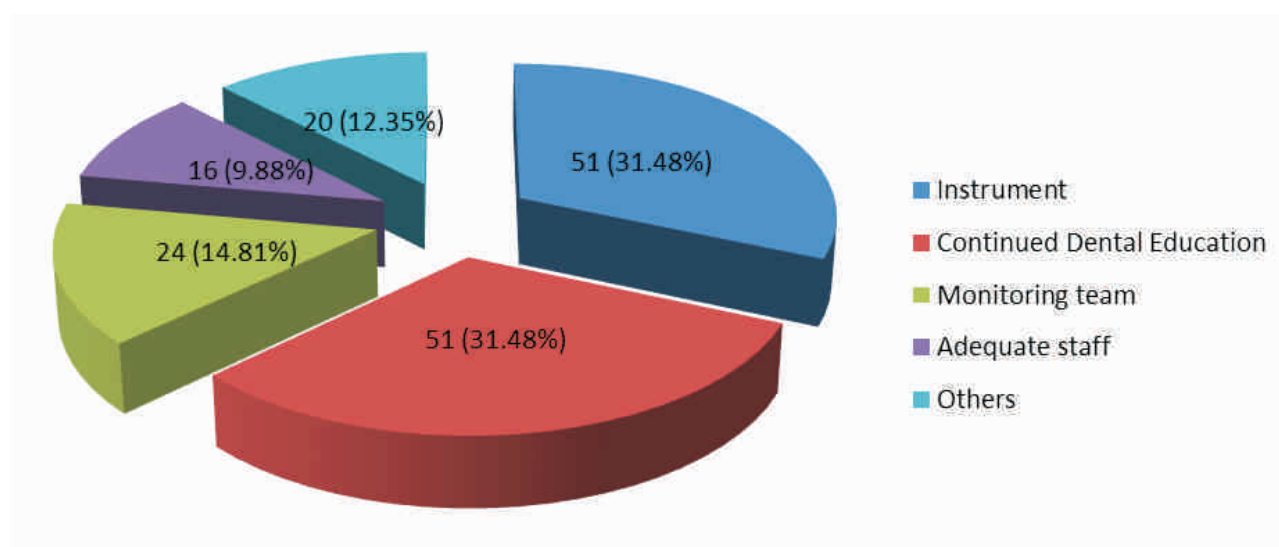


Fig. 1: Respondents suggestions for compliance in UBTH.

Range of suggestion made by respondents to enable for strict compliance with standard infection control practices in Dentistry, UBTH. The need for a routine program of continuing Dental education on infection control and provision of adequate instrument ranked the highest with a total of fifty-one (31.48%) respondents making that suggestion. While the setting up of a monitoring team and other suggestions not in the list suggested in the questionnaire followed in ranks of twenty-four (14.81%), and twenty (12.35%) respondents respectively. The least suggested measure, was the need for more staff.

Discussion

The need for compliance to standard infection control practices and basic principles in our clinics /hospitals cannot be over emphasized. There are nine major recommendations for infection control given by the report of the Centre for Disease Control (CDC) in 2003. 1) Educating and protecting the Dental Health Care Personnel. 2) Preventing transmission of blood borne pathogens. 3) Hand hygiene. 4) Personal protective equipment. 5) Contact dermatitis and latex hypersensitivity. 6) Sterilization and disinfection of patient-care items. 7) Environmental infection control. 8) Dental unit water lines, biofilms and water quality and 9) Special consideration of Dental Hand pieces and other devices, radiology, parenteral medication oral surgical procedures, and dental laboratory. These are the bedrock on which infection control practices are drawn in different settings and places. The use of Personal Protective Equipment is expected to be a basic daily routine practice in all oral health care centre and it consist of items such as gloves, facemask, eye goggles/face shield, protective coat/clothing and finger guards when suturing. In this study, almost all the respondents had good compliance with routine use of gloves 103(92.8%), 82 (73.9%) routinely wear face mask, but a smaller number of respondents change their face mask in between patient care 68 (61.3%). Face mask ought to be routinely changed after every 20 minutes due to contamination from sweat microbial air contamination of the clinic environment (Salisbury and Percival, 2019; Garner,1996). A total of 79 (71.1%) of the respondents wear ward coats/protective clothing routinely. The practice of hand washing before and after wearing gloves in this study, showed that more of the respondents practiced washing hands after degloving much more than before 53(47.7%), and 93 (83.8%) respectively. This is very likely due to the lack of knowledge about the need for their hands to be disinfected first before even wearing the gloves, in order to further reduce the chances of contamination and cross infection from DHCP to patient the need to wash after degloving is always obvious as there would be visible contamination of the hands from the latex or other materials. These results are close to that of the study of compliance with

infection control practices of dental nurses and other dental staff in Jordan. It reported a 100% compliance with the use of gloves for the dental staff, 100% compliance with the practice of hand washing after degloving among the nurses. Compliance with the use of face mask was reported to be poor, 30%, and 43% among nurses and dental staff respectively. The routine use of goggles was quite poor 28 (25.2%), as with similar studies, where compliance with routine use of goggles was 4.8% and 14.7% respectively (Bancescu et.al.,1999; Woods, 1995) The non-compliance with the wearing of eye goggles or face shield is also a pointer to the negligent attitude of most DHCP towards protection of the eyes and because they also under rate the chances of cross infection through the conjunctiva. There's need to auto clave hand pieces in between patient care, because of the suck back effect of the anti-retraction valves of the device, the suck back of saliva and blood during use, results in significant contamination of the inner and outer surfaces of the device, such that simple disinfection of the outer surfaces of the device is inadequate. In this study, compliance with autoclaving handpieces in between patient treatment was also poor 36 (32.4%), compliance with proper regulation of the autoclave/ sterilizer was fair 62 (55.9%), while appropriate disposal of sharps, and liquid was good 78 (70.3%), and 79 (71.2%) respectively. Many studies have reported that dental prosthesis from the laboratory as well as dental impressions from patients mouth for fabrication of prosthesis in the laboratory, are potential sources of infection, both to the patient and the Dental Laboratory Scientist (Kugel et al.,2000; Sofou et al., 2002; Witt and Hart, 1990). The disinfection of both the impressions in the clinic before been sent to the laboratory and the prosthesis from the laboratory, before being delivered to the patient, are of paramount importance to infection control in the dental settings. A total of 57 (51.4%) and 61 (55.0%) of the respondents were compliant in this study, which is a fair level of compliance, but still points to the absence of strict compliance to the practice this may be attributable to the downplay of the relevance of this practice to infection control. Adequate education on the subject and possible scientific investigatory studies in the centre in this regard would go a

long way in assisting compliance with the practice. The routine use of rubber for isolation during treatment and suction for saliva evacuation, are very important in the control of airborne infections. The level of compliance with this practice in this study was grossly inadequate in spite of its obvious importance. The reason for this is not far-fetched, as the centre either lacked the facility or had insufficient number for routine use. Some of the suction machines that were available were not even in good working condition. One of the major ways of staff protection is by immunization in the dental setting due to routine exposure to blood and saliva, hepatitis B vaccination is mandatory. 73 (65%) had received at least one dose of the vaccine, but only 29 (26.1%) had completed three the doses. Adequate protection against the virus is only conferred on those who have been completely vaccinated. This low level of compliance with complete HBV vaccination was similarly reported in other studies (Oosthuysen *et al.*, 2010; McCarthy *et al.*, 1999; Wood, 1995). Other studies reported a good/moderate level of compliance (Fabian, 2006; Taiwo and Aderinokun, 2003; Olulola-Sofo, 2003). The reasons for non-compliance with adequate vaccination against HBV, is very likely due to the required number of doses for complete vaccination and negligence on the part of the DHCP. Routine, annual checks of vaccination status of staff status will help compel them to attain a complete vaccination status. A total of 52 (46.8%) of the total population studied had good compliance with infection control practices on a broad basis, while 12 (10.8%), had a fair/moderate compliance, 47 (42.3%) had poor compliance. This infers that there are challenges to good compliance that requires attention in this centre and other similar centre. Some other studies have reported similar results (Fabian, 2006). There was no significant relationship between profession and the general level of compliance ($p=0.199$).

Many reasons were proffered as challenges to cross-infection control in this study on the basis of the suggestions made in the questionnaire. A total of 50 (45%) of the respondents supported the lack of adequate instrument and materials as a

challenge, 28 (25.2%) reported the lack of sufficient manpower and some even wrote on their questionnaires lack of nurses. Thirty-six (32.2%) reported the lack of efficient, sufficient, up to date equipment as a challenge. Only a few respondents accepted negligence and ignorance as reasons for their non-compliance 20 (18%) respectively.

About 51 (45.9%) of the respondents suggested provision of adequate instruments and materials as measures to encourage good compliance with infection control, 51 (45.9%) also suggested the need for routine continuing dental education on infection control, as a way of improving both knowledge and compliance even if about 46 (41.4%) of the overall respondents had attended the program at one time or the other, with majority of them attending in the last one year 21 (18%).

Sixteen (14.4%) of the respondents suggested employment of more staff, while 24 (21.6%) suggested the setting up of a monitoring team. Other suggestions made include, use and provision of disposable items, division of the clinic into cubicles, establishment of more immunization centers, enactment of penalties against non-compliant staff, practicing the central sterilizing system/department specifically for dentistry, etc. It is obvious from this suggestion that, the management of the hospital has a major role to play in combating these challenges.

In this study, 42 (37%) of the respondents rated infection control in UBTH as 80% compliant, 38 (34.2%) rated it as 50% while 15 (13.5%) rated it as 20%. However, 95 (85.6%) expressed belief in the possibility to observe strict compliance with infection control practices in the centre.

Conclusion

Although, the average level of compliance of the DHCP of UBTH was good, some basic important principles were not been observed such as routine autoclaving of hand pieces in between patients during treatments, an almost complete absence of the use of rubber dam for isolation during treatment procedure, poor compliance with the use of face goggles during patient care, and poor compliance with the use of suction for moisture control.

The study was concluded in the affirmative that strict observance of standard infection control practices is possible in the Centre if these challenges are addressed

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