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# Evaluation of the Cost of Hygiene and Asepsis in the Dental Consultation and Treatment Center

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## Abstract

Our study's main goal is to assess the overall cost of asepsis and hygiene procedures across all divisions of the dental consultation and treatment center. A descriptive cross-sectional study was conducted to meet this goal, and data were gathered using a questionnaire customized for the investigation. Software called SPSS was used for the data analysis. The findings of our survey have drawn attention to the significant expense incurred by the Casablanca Dental Consultation and Treatment Center (CDCT) in order to adhere to the various asepsis and hygiene recommendations. Each CDCT department is equipped with various methods for patient protection, consumables they will need, pre-disinfection, packaging, and sterilization equipment. When compared to other departments, some, like conservative dentistry and assistant and joint prosthesis, use more gloves than others. The CDCT can continue to improve the standard and cost of hygiene by applying recommendations, being organized rigorously, respecting the asepsis chain, and having management expertise.

**Keywords:** Cost of Hygiene Procedures, Consultation and Dental Treatment Center

## 1. Introduction

Dental work involves exposure to a septic environment, blood exposure, and cross-contamination for the dentist, medical personnel, and patients. (Upendran 2023) It is one of the occupations most vulnerable to respiratory illnesses like COVID-19. These dangers are actual and present at all times. (Williams-Wiles, 2019) To ensure the safety of both the patient and the medical staff, it is crucial to implement hygiene and asepsis measures. (Williams-Wiles, 2019)

Regarding the security of both patients and the medical staff, hospital hygiene is crucial. Reducing cross-contamination is the goal of these measures. Dentists are required by law to take all necessary precautions to prevent the transmission of infections in their offices, according to the U.S. Infection Control Guidelines published

by the Centers for Disease Control and Prevention, a collaborator of the International Association of National Institutes of Public Health. (Villani, 2019)( Amazian, 2006)

Due to all of these factors, implementing hygiene and asepsis measures is an ethical requirement that comes at a cost to waste management, depreciable equipment (such as an autoclave), consumable materials (such as gloves), and maintenance. A sizable financial impact results from raising the standard of care provided to the public in all healthcare facilities generally and in the CDCT specifically. Our project's objective is to calculate the total cost of hygiene and asepsis procedures at the level of the various CDCT departments.

## 2. Materials and Methods

Various departments of the Casablanca Dental Consultation and Treatment Center (CDCT) of University Hassan II, Morocco, participated in a descriptive cross-sectional study. We included in our survey all departments (periodontology, oral surgery, prosthodontics, orthodontics, pediatrics, endodontics, emergency) that have a sterilization room in addition to the central sterilization. Departments like the radiology department, laboratory, and reception were not included because they lacked a sterilization room and had no direct contact with patients' oral cavities. The quantity and price of personal protective equipment (PPE), consumables for dental staff and patients, medical device processing and traceability, and cleaning service outsourcing were all gathered using a questionnaire. Additionally, the questionnaire asked about the annual maintenance and waste management costs. The Community Health Epidemiology and Biostatistics Laboratory of the Casablanca Faculty of Dentistry conducted the data analysis.

## 3. Results

After contacting each department on the list, we found that our survey had a 100% response rate. - Personal protection equipment Dental uniforms: Information on the price and quantity of uniforms for routine tasks and surgical procedures is shown in table I. Personal protective equipment had an annual cost of 4,800 dinars and was used more frequently in operating rooms and departments dealing with oral surgery. (26,31%) Paper hand towels and solution dispensers, with global costs of 18240 dirhams and 8000 dirhams, respectively, were available in all departments. Similar to this, Departments have 779 trash cans that cost a total of 33,750 dirhams.

### 3.1. The patients' essential consumables

Table II shows the quantity and price of drapes, dental saliva ejectors, and dental drinking cups.

Only a small number of departments, including Emergency, Pediatrics, and Endodontics, use rubber dams. A higher rate (66,66%) of 360 boxes were consumed annually in the endodontics department. 14 400 dhs were the estimated cost per year.

-Traceability and processing of medical devices

### 3.2. Pre-disinfection

All departments had 5L containers of pre-disinfection liquid, with an annual consumption of 240 cans, in order to respect the hygiene and asepsis chains.

The department of emergency recorded the highest consumption rate. The price per year is 72,000 dirhams.

Table shows the number and price of pre-disinfection containers in various departments.

### 3.3. Cleaning

Brushes are used to clean dental instruments that can be used again and again. The central sterilization only has one thermal disinfectant, which costs 453 000 Dhs.

### 3.4. Packaging

Sterilization pouches in the following sizes are used to package instruments for sterilization: (100X200), (150X200), (200X200), and (250X200). The department of endodontics recorded the highest consumption. The sterilization pouches (200x200) were the most popular and cost a total of 204 504 Dhs per year.

### 3.5. Sterilization

Two autoclaves that each cost 3200000 Dhs are used in the sterilization process at the central sterilization facility. Water distillers are needed for the sterilization process; our building has one for a cost of 3000 DHS. -Traceability The annual cost of the physical and chemical indicators used in the central sterilization is 1920 Dhs, and 720 packs of the Bowie-Dick test are consumed. Registers are also used for traceability, and they cost 192 DHS per year.

### 3.6. Rotary instruments

Each of the departments of emergency, endodontics, surgical dentistry, pediatrics, and periodontology has a DAC autoclave for rotating instruments. The cost of lubricants for rotary instruments was estimated to be 132 600 Dhs per year, with conservative dentistry accounting for a sizable portion of that cost (30.77%).

### 3.7. Surface treatment and biocleaning

The annual cost to the CCTD of outsourcing biocleaning is Dhs 116,832.

### 3.8. The Waste management

The annual cost of outsourcing waste to the CCTD is Dhs 36,924.

### 3.9. The cost of the Annual maintenance

The cost of the annual maintenance is 89 124 Dhs per year

Table I: consumption of professional clothing according to the services

Department	Clothing	Quantity needed /year	The cost /year (Dhs)	Percentage
<b>Endodontics</b>	Coats	15	1350	8,77
	Scrubs	15	1875	24,19
<b>Orthopedics</b>	Coats	17	1530	9,94
	Scrubs	0	0	0
<b>Removable prosthodontics</b>	Coats	17	1530	9,94
	Scrubs	0	0	0
<b>Fixed prosthodontics</b>	Coats	20	1800	11,7
	Scrubs	0	0	0
<b>Pediatrics</b>	Coats	32	2880	18,72
	Scrubs	2	250	3,22
<b>Emergency</b>	Coats	8	720	4,68
	Scrubs	3	375	4,84

	Sterile disposable gowns	12	420	0,8
	Reusable gowns	0	0	0
<b>Oral surgery: Department and surgery room</b>	Coats	23	2070	13,45
	Scrubs	23	2875	37,1
	Sterile disposable gowns	1440	50400	96
<b>Periodontology Department and surgery room</b>	Reusable gowns	360	43200	48
	Coats	39	3510	22,80
	Scrubs	19	2375	30,65
	Sterile disposable gowns	48	1680	3,2
	Reusable gowns	384	46080	52

NB : n : Numbe

Table II: quantity and cost of annual personal protection consumables according to the services

Department	Quantity needed /year					The cost /year (Dhs)					Percentage
	Mask	Gloves	Hair caps	Disinfecting wipes	Hand towel	Mask	Gloves	Charlottes	Disinfecting wipes	Hand towel	
Emergencies	144	148	48	288	144	2880	41232	8148	15840	7920	12,32
Endodontics	360	121	120	240	120	7200	3604	20376	13200	6600	8,26
orthopedics	240	100	12	144	216	4800	27840	2037.6	7920	11880	8,5
<b>Fixed prosthodontics</b>	240	145	24	240	120	4800	40440	4075.2	13200	6600	3,21
<b>Removable prosthodontics</b>	480	144	120	120	144	9600	40176	20376	6600	7920	13,72
Surgical dentistry	192	145	48	144	240	3840	21984	8148	7920	13200	16,93
Pediatrics	240	303	84	120	144	4800	3984	14268	13200	7920	7,16
Periodontology	192	900	96	240	216	3840	21972	16308	13200	11880	10,89
Operating room of oral surgery department	36	121	48	36	96	720	9132	8148	1980	5280	18,06
Operating room of Periodontology department	36	312	24	36	12	720	2484	4075.2	1980	660	0,95
Total	2160	408	624	1728	1452	43200	212848	105960	95040	79860	100%

Table III: consumable necessary for the care of the patients according to the services

Department	Quantity needed /year			The cost /year (Dhs)			Percentage
	Drapes	Salivary cannula	Cups	Drapes	Salivary cannula	Cups	
Emergencies	144	96	144	9024	1824	2448	9,22
Endodontics	264	120	120	16760	2280	2040	14,62
Orthopedics	180	120	72	12190	2280	1224	10,9
<b>Fixed prosthodontics</b>	156	24	36	5112	456	612	4,28
<b>Removable prosthodontics</b>	480	120	156	10536	2280	2652	10,72
Oral surgery	876	96	192	14136	1824	3264	13,34
Pediatrics	156	120	144	10536	2280	2448	10,58
Periodontology	372	144	144	17304	2736	2448	15,59
Operating room of oral surgery department	1476	48	48	9456	912	816	7,76
Operating room of periodontology department	276	24	24	3456	456	408	2,99
Total	4380	912	1080	108510	17328	18360	100

Table IV: Distribution of pre-disinfection and costs according to the services

	Department	The quantity needed		The cost (Dhs)	
		n	%	n	%
Pre disinfection container (5L)	Removable prosthodontics	1	25,00	600	25,00
	Endodontics	1	25,00	600	25,00
	Pediatrics	2	50,00	1200	50,00
Pre disinfection container (10L)	Emergencies	1	11,11	790	11,11
	Oral surgery	3	33,34	2370	33,34
	Oral surgery and Periodontology operating rooms	2	22,22	1580	22,22
	Periodontology	2	22,22	1580	22,22
	Pediatrics	1	11,11	790	11,11
Pre disinfection container (15L)	Orthopedics	2	33,33	1580	33,33
	Removable prosthodontics	1	16,67	790	16,67
	Oral surgery	2	33,33	1580	33,33
	Endodontics	1	16,67	790	16,67
Pre disinfection container 20L)	Periodontology	1	100	850	100

NB : n : Number, L : liters

#### 4. Discussion

The price of hygiene and asepsis practices within the CCTD Casablanca departments has been made clear by this work. The response rate was 100%, demonstrating the willingness of all departments to improve resource management and utilisation. Infections called "cross infections" can develop during dental procedures. They are a significant patient health issue as well as an all-encompassing public health issue (Cali,2016). Lack of infrastructure, inadequate equipment, poor hygiene conditions, failure to follow hygiene protocols, and inadequate knowledge of health professionals are risk factors for cross infection (Allagher 2020),(Abalkhail, 2022).

The standard of care we offer to the population in all healthcare facilities in general and at the CCTD in particular requires the prevention of cross-infection. However, after every procedure, non-disposable instruments, the dental unit, and work surfaces must be cleaned and sterilized (Alhumaid,2021). We found some results in our survey that, for the most part, seem reasonable and proportionate to the number of patients and the needs of the departments. A better financial management of hygiene and asepsis measures is necessary as a result of some results being absurd.

Our findings are discussed using the SWOT analysis (Strengths - Weaknesses - Opportunities - Threats): the strict adherence to asepsis and hygiene regulations, which were applied uniformly across all departments. **Our study's strengths** are the strict adherence to asepsis and hygiene regulations that apply to all departments. All dental healthcare professionals receive coats every year, and 55% of departments had eye protection. The UK's findings, which showed that 31% of departments use goggles when the risk of infection is high, are consistent with these findings, confirming the CCTD's role in personal protection.

Hand drying is necessary for good hand hygiene. According to our findings, every department at CCTD has both solution and paper hand dispensers. These outcomes surpass those of a study conducted in Algeria at the Mustapha

University Hospital, where only 5% of departments have single-use hand towel dispensers and dispensers for paper towels. In the Mediterranean region, a multicenter study found that hand towel dispensers were present in 2.8% of cases and single-use towels were present in 16.7% of cases (Amazian, 2006). The CDTC spends 79,860 Dhs on hand towels every year. In Morocco, research conducted in a classroom setting at the HASSAN II University Hospital in Fez reveals that every 50 patients require an annual hand towel expenditure of Dhs 2,250. (Sumba,2018). An identical study done at the Ibnou Rochd University Hospital in Casablanca's intensive care unit over a period of six months revealed that the hospital spends 4,500 Dhs (10 on hand towels for every ten patients. (Obtel,2011)

The CDTC has hydroalcoholic solution dispensers in every department. Our surpass those of the multicenter study on hand hygiene tools and practices in the Mediterranean Region, which was carried out in 22 hospitals and found that only 9.5% of hospitals had dispensers for hydroalcoholic solution (Amazian, 2006). Since many departments' activities are shorter and more frequent, which calls for more hand towels, the CDTC's expenditures are justifiable.

All departments have functional and accessible trash cans. Our findings outperform those of the Nosomed Network's multicentric study (Amazian, 2006), which found that trash cans are present in 58.2% of hospitals. Predisinfection is the initial procedure used on items and materials contaminated by organic matter in order to lessen microorganisms, make it easier to clean them later, and protect people and the environment (Hassan 2017), (Aque,2018). In our building, this act is carried out using a variety of tools, including brushes and disinfectant. Only two out of Mali's four hospitals pre-disinfect surgical supplies (Traoré,2016). In Senegal, one-third of hospitals routinely predisinfect surgical supplies before sterilizing them (Traoré,2016).

Through Bowie Dick tests, sterilization quality control is carried out. The CDTC uses 720 boxes annually. In the Dakar main hospital's sterilization unit, the Bowie Dick test was routinely carried out before using the steam sterilisers each morning (Traoré,2016).

Outsourcing helped to lower the cost of the cleaning service; it cost 9736 Dhs per month, or 116832 Dhs annually. In France, the cost of hospital building maintenance is 16% less expensive than managing it internally (77 euros/m<sup>2</sup> versus 92 euros), but this effectiveness is dependent on how well staff is utilized and how well monitoring and control are carried out (HISM,2008). A study at the Mahalapye Hospital in Botswana revealed that outsourcing cleaning costs 18 million Botswana pula (BWP), or 13.51 million Dirhams over three years (Cali,2016). According to a study done at the IBN ALKHATIB hospital in Fez, Morocco, the annual budget for cleaning services is 547,000.00 Dhs (Choubani,2010). These outcomes are better than those in the CCTD.

## 5. The Weaknesses

Our study's findings point to an uneven distribution of consumption and activity within some CDTC departments. For instance, some departments, particularly prosthodontic departments, use a lot of gloves relative to the number of procedures they perform (40 176 Dhs/year). The procedures in these departments require multiple sessions to complete a single act, which results in additional glove consumption. In contrast, procedures in the emergency department are completed in a single session. According to a study at the Multidisciplinary University Hospital in Turkey, non-sterile glove costs exceed 468,163 DHS annually (YIGIT,2016).

The Ministry of Health covers the cost of the CDTC staff's annual hepatitis B vaccination. The prevalence of vaccination against viral hepatitis B is approximately 94% in developed nations (Cantineau,2002). Based on voluntary participation, 62% of medical professionals in our nation have received the covid vaccine (Khalis,2021), and 64% have received the hepatitis B and C vaccine (Laraqui,2009). At 94% among nurses and 71% among doctors at the Marseille Regional Hospital (Laraqui,2009), this rate is higher than that seen in Nigeria (5%), but much lower than that reported in nations where vaccination is required. (Laraqui,2009)

## 6. Threats

The results of our survey can be attributed to students' inexperience and lack of instruction in the management of consumable materials. These findings suggested that in order to optimize the use of resources in the CCTD, management training programs should be implemented among the medical and paramedical staff.

A study of 100 dental students found that only 8 had a good understanding of hand hygiene practices, while 77 had a moderate understanding and 15 had a poor understanding (POOJA,2016). According to Khairun Nisa et al., while 25.4% of students had moderate knowledge of hand hygiene, 74.6% of students had good knowledge. 100% of respondents practiced good hand hygiene, and 50% of them followed the suggested guidelines (Khairun,2023).

The medical care plan system (MCPS), which causes an imbalance between the hospital's expenses and revenues, should also be taken into account. This is so because more and more patients are receiving benefits from the MCPS, while all patients—paying or not—are subject to the same application of hygiene measures.

## 7. Conclusion

The results of our survey showed how costly it is for the CCTD to adhere to various asepsis and hygiene recommendations around the world. You can't Put a Price on Health has become the guiding principle for everyone, including patients, practitioners, health organizations, and the medical community. The following recommendations have been made in light of our findings: - Recognize professional management and management weaknesses, and hire management experts to improve the management of various CCTD resources. - Identify opportunities and long-term strategic directions for the development of the CCTD. - A change in and improvement of work practices. This transformation is only possible with the support of ongoing training for both students and medical staff, as well as widespread participation because it affects everyone.

To ensure the long-term upkeep of the CCTD, cultivate a sense of ownership among the instructors, practitioners, students, and personnel assigned to various posts and departments. Involving professionals in seminars on the economy of consumables to educate them on how to use resources more wisely and cut back on consumption while also raising awareness of costs. - Trying to educate sterilization personnel to improve stock management

## Conflicts of Interest

The authors declare no conflicts of interest.

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