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Cost of Implementation and Maintenance of Dental Care in a Hospital Setting

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Abstract

To analyze the costs of implementing and maintaining dental care in the hospital, a partial economic analysis was conducted to calculate the average costs for implementing and maintaining a dentist in the hospital. The average cost of implementation, the average monthly maintenance cost of the professional in the hospital setting, monthly maintenance of permanent equipment and instruments, and monthly cost of consumable materials were calculated. Sensitivity analysis varied the values by 20%. The average cost of implementing dental care in a hospital setting is R$32,327.97 (R$25,862.38 - R$38,793.56) considering the use of a dental chair, and R$28,762.53 (R$23,010.02 - R$34,515.04) considering the use of portable equipment. The monthly maintenance of the dentist in the hospital had an average value of R$10,528.11 (R$8,422.49 - R$12,633.73). The costs for maintaining dental care in a hospital setting are approximately one-third of the implementation cost. It would be necessary to treat 32 patients to ensure the service's maintenance.

Keywords

Health Evaluation, Oral Health, Hospital Costs, Hospital Dental Services, Dentists

1. Introduction

The role of dentists in a hospital setting is still very limited, as these professionals are not part of the multidisciplinary team in most Brazilian hospitals (Sousa et al., 2014; Silva et al., 2017). Nevertheless, there are numerous systemic diseases that can have oral manifestations and can result from inadequate oral health

conditions, such as biofilm accumulation, poor hygiene, and periodontal disease (Silva et al., 2017; Jun et al., 2021). Maintaining oral health is essential for a good quality of life (Guan et al., 2024). For patients in Intensive Care Units (ICUs), good oral health is necessary to prevent the proliferation of bacteria and fungi, which can affect other organs and systems, exacerbating the clinical condition and consequently extending their stay in the ICU (Blum et al., 2018; Gomes & Castelo, 2019; Malhan et al., 2019).

Ventilator-associated pneumonia (VAP) is the most common infection in critically ill hospitalized patients, affecting between 9% and 27% of intubated patients (Schreiber & Shorr, 2017). Oral health conditions are directly linked to the onset of VAP, as microorganisms aspirated from the oral cavity into the airways can migrate to the lungs, triggering this infection (Bellissimo-Rodrigues et al., 2014; Bellissimo-Rodrigues et al., 2018; Warren et al., 2019). Furthermore, VAP can increase mortality and the length of stay in the ICU, representing a significant portion of hospital costs (Malhan et al., 2019; Kollef et al., 2012).

A recent systematic review has shown that hospital dental care has the potential to reduce morbidity and mortality in patients with VAP (Araújo et al., 2022). It is estimated that the costs of treating VAP can reach up to an average of $40,000 in hospitals in the United States (Warren et al., 2019). The implementation of hospital dental care is suggested to represent cost savings, in addition to reducing morbidity and mortality in affected patients.

It is known that hospital dental care has the potential to reduce morbidity and mortality, especially in people admitted to intensive care units (ICU). Despite studies suggesting that the inclusion of dentists in a hospital setting may reduce hospital costs in Brazil (Blum et al., 2018; Schreiber & Shorr, 2017; Bellissimo-Rodrigues et al., 2018), conducting an economic evaluation can assist decision-makers and emphasize the importance of including these professionals in multidisciplinary teams. Therefore, this article aims to analyze the costs of the implementation and maintenance of dental care in a hospital setting.

2. Material and Methods

A partial economic analysis was conducted to calculate the average costs of implementing and maintaining a dentist in the hospital, based on mathematical modeling and outlined according to the Economic Evaluation Guidelines of the Brazilian Health Technology Assessment Network (REBRATS), using the Consolidated Health Economic Evaluation Reporting Standards (CHEERS) and internationally accepted recommendations (Husereau et al., 2013; Brasil Ministério da Saúde, 2014a; Drummond et al., 2015). For the analysis, the perspective of a hospital manager linked to the Unified Health System (SUS) was considered.

The average prices of permanent materials necessary for hospital dental care were collected, such as dental chairs or equipment, photopolymerizers, dental ultrasonography, high and low-speed handpieces, among other materials. Additionally, consumable materials such as gloves, caps, masks, composite resin, and

instruments like curettes, forceps, probes, and mirrors were collected from the Ministry of Economy Price Panel (https://paineldeprecos.planejamento.gov.br/) and the Federal Government Procurement Portal (http://comprasnet.gov.br/Livre/Ata/ConsultaAta00.asp) (Collins et al., 2021). The dentist's salary was based on the Brazilian Hospital Services Company (EBSERH) rate for a 30-hour professional. These values are for the year 2022.

The data were analyzed descriptively and from the collected values, the average cost for implementing a dentist in a hospital was calculated, based on the sum of the average values of permanent materials. Furthermore, the average monthly cost of maintaining the professional in a hospital was calculated, considering the sum of the dentist's salary, their 13th-month salary, 1/3 of their vacation pay (1/12 of the total value, considering monthly cost), their taxes and charges (31% of the total salary), monthly maintenance of permanent equipment (10% of the average implementation values, spread over 12 months), monthly maintenance of instruments (1/12 of the total instrument value, considering annual renewal), and the monthly cost of consumable materials.

To deal with parameter uncertainty, univariate sensitivity analysis was applied, varying the values by 20% more, considering a pessimistic scenario, and 20% less, considering an optimistic scenario (Drummond et al., 2015). All values were tabulated, and calculations were performed using Excel.

3. Results

Table 1 describes the consumable materials, their quantity, and their average cost. The base value for acquiring consumable materials used for hospital dental care is R$1586.62 (R$1269.30 - R$1903.94).

Table 1. Description of the quantity and average cost of consumable materials used for dental care in a hospital.

Consumable Materials	Quantity	Average Cost
Gloves	100	73.05
Cap	100	R$42.05
Mask	50	R$64.15
Composite Resin	5 (syringe 4 g)	R$150.00
Adhesive + Primer	1 (bottle 6 g)	R$93.02
Phosphoric acid 37%	3 syringes (2.5 mL)	R$30.75
Local anesthetic	50	R$387.60
Needle	100	R$62.42
Glass Ionomer Cement	1	R$160.52
Cariostatic	1	R$47.36
Chlorhexidine 0.12%	1 (bottle 250 mL)	R$90.84
Microbrush	100	R$19.26
Matrix Band	1 (50 cm)	R$4.43

Continued

Fluoride Gel	1	R$15.88
Suture Thread	24	R$199.44
Suction device	50	R$85.20
Cotton Roll	100	R$4.24
Scalpel Blade	100	R$24.74
Chlorhexidine 2%	1L	R$31.67
	Base Scenario	R$1586.62
Total	**Pessimistic Scenario (+20%)**	R$1903.94
	Optimistic Scenario (−20%)	R$1269.30

Regarding the cost of instruments for dental care in hospitals, the base value for acquisition is R$6415.03 (R$5132.02 - R$7698.04), as shown in Table 2, along with the quantity and average cost of the considered instruments.

Table 2. Description of the quantity and average cost of instruments used for dental care in a hospital.

Instruments	Quantity	Average Cost
Gracey Curettes (kit)	3	R$867.30
McCall Curettes (kit)	3	R$865.00
Ultrasound Scaler Tip	3	R$834.42
Glass Plate	3	R$140.13
Carpule Syringe	3	R$127.47
Explorer Probe	3	R$28.71
Periodontal Probe	3	R$97.68
Mirror	3	R$117.42
Tweezers	3	R$38.37
Spatula	3	R$236.91
Straight elevator	3	R$91.83
Triangular-type elevator (L)	3	R$82.44
Triangular-type elevator (R)	3	R$85.05
Forceps n˚ 150	3	R$203.94
Forceps n˚ 151	3	R$206.97
Forceps n˚ 16	3	R$210.96
Forceps n˚ 17	3	R$198.30
Forceps n˚ 18R	3	R$210.75
Forceps n˚ 18L	3	R$204.81
Forceps n˚ 69	3	R$207.96
Forceps n˚ 65	3	R$206.58
Spatula n˚ 7	3	R$40.05

Continued

Hollenback n˚ 3	3	R$44.51
Manipulation spatula	3	R$33.66
Matrix holder	3	R$85.59
Scalpel handle	3	R$156.06
Drills	3	R$686.70
Scissors	3	R$78.64
Dentin spoon/excavator	3	R$26.82
Total	**Base scenario**	R$6415.03
	Pessimistic scenario (+20%)	R$7698.04
	Optimistic scenario (−20%)	R$5132.02

The average cost of implementing dental care in a hospital setting is shown in Table 3. The base value is R$32,327.97 (R$25,862.38 - R$38,793.56) when considering the use of a dental chair, and R$28,762.53 (R$23,010.02 - R$34,515.04) when considering the use of portable equipment (Table 3).

Table 3. Average cost of permanent materials and average cost of the dentist's implementation in a hospital, considering optimistic and pessimistic scenarios.

Permanent Materials	Quantity	Average cost
Dental chair equipment	1	R$11,055.44
Photopolymerizer	1	R$450.04
Dental ultrasound	1	R$1507.13
High-speed dental handpiece	1	R$648.34
Low-speed micromotor dental handpiece	1	R$338.82
Low-speed straight dental handpiece	1	R$452.61
Low-speed contra angle dental handpiece	1	R$1235.93
Low-power laser	1	R$3189.98
Dental X-ray machine	1	R$12,397.53
Stool	1	R$612.66
X-ray viewer	1	R$439.49
Portable dental equipment	1	R$7490.00
Total (Considering dental chair equipment)	**Base scenario**	R$32,327.97
	Pessimistic scenario (+20%)	R$38,793.56
	Optimistic scenario (−20%)	R$25,862.38
Total (Considering portable dental equipment)	**Base scenario**	R$28,762.53
	Pessimistic scenario (+20%)	R$34,515.04
	Optimistic scenario (−20%)	R$23,010.02

The average cost of services and the monthly maintenance of a dentist had a

base value of R$10,608.85 (R$8487.08 - R$12,730.62), as shown in Table 4. The maintenance value is approximately one-third of the average implementation cost.

Table 4. Average cost of services and monthly maintenance of a dentist in a hospital.

Service		Average cost
Dentist salary (30h)		R$5793.43
Year-end bonus[1]		R$643.71
Taxes and charges[2]		R$1795.96
Maintenance of permanent materials[3]		R$254.54
Consumable materials		R$1586.62
Maintenance of instruments[4]		R$534.59
Average monthly maintenance cost	**Base scenario**	R$10,608.85
	Pessimistic scenario (+20%)	R$12,730.62
	Optimistic scenario (−20%)	R$8487.08

[1]1/12 of the total value, considering a monthly cost; [2]31% of the salary; [3]10% of the average cost of implementation, divided by the 12 months per year; [4]1/12 of the total of instruments, considering an annual renovation.

4. Discussion

The oral hygiene condition of hospitalized patients is a significant factor related to the risks of oral and systemic infections. Therefore, the presence of a dentist in a hospital setting is crucial to ensure oral health, well-being, the prevention of complications, and the recovery of these patients (Jun et al., 2021; Ishikawa et al., 2021). As such, the data from this study demonstrate the importance of the inclusion of these professionals in tertiary care, requiring the allocation of resources for this investment.

Considering the cost required for the monthly maintenance of hospital dental care and the cost to implement this service, maintenance constitutes one-third of what is needed to establish dentistry in hospitals. The Ministry of Health provides a financial transfer of R$328.34 for each hospital dental care service (Brasil Ministério da Saúde, 2010), indicating that 32 patients need to be treated to cover the maintenance of this service, taking into consideration that the average base cost for the monthly maintenance of the dentist in a hospital setting found in this study is R$10,608.85. Therefore, the number of patients to be treated to maintain dental care in hospitals is relatively low and feasible to execute.

The 3rd National Oral Health Conference that took place in 2004 highlighted the need to secure resources for hospital dental care. It is suggested that dental professionals be integrated into the hospital context to monitor the oral health of hospitalized patients throughout various aspects of treatment. Furthermore, it ensured the inclusion of hospital dental procedures in the Hospital Information System of the Unified Health System (SIH-SUS) (Conselho Federal de Odonto-

logia, 2004).

Moreover, Technical Note No. 01/2014 from the Ministry of Health allowed for the registration of all dental procedures performed in hospitals in SIH, even if they are not procedures for patients with special needs (Brasil Ministério da Saúde, 2014b). However, in 2019, Bill No. 34/2013, which aimed to regulate the requirement for dental care in a hospital setting, was vetoed, citing a significant financial impact on public funds if implemented and deeming it unconstitutional (Brasil Congresso Nacional, 2019).

After this Bill was vetoed, a study proposed by the Health Technology Assessment Center (NATS) demonstrated that dental treatment of hospitalizations for oral mucositis could generate savings of up to R$4 million. Furthermore, the implementation of preventive outpatient treatment could save up to R$10 million for the country. In addition, the establishment of oral care protocols in ICU can reduce the risk of VAP occurrence by 46%, resulting in a reduction of R$2854.00 per patient (Anschau et al., 2017).

Finally, it is important to emphasize the need to implement strategies to ensure the financing of dental services in a hospital setting that is approved by the majority of managers, and methods that can identify the relationship with socioeconomic determinants, as suggested by Holzer et al. (2014). Also, Claussen (2022) suggests the involvement of the Federal Council of Dentistry in the development of minimum guidelines for the work of dentists in ICU. Furthermore, it advocates for the inclusion of a new procedure in the SIGTAP table to enable the performance of clinical procedures in hospitals, which are currently classified as Basic Care and, therefore, do not receive financial value and are not billable. These measures can encourage managers to support and approve the inclusion of dentists in hospital teams.

5. Conclusion

In conclusion, the costs for maintaining dental care in a hospital setting are approximately one-third of the implementation cost. Considering the Ministry of Health's funding for hospital dental care (R$328.34), it would be necessary to treat 32 patients to ensure the service's maintenance. It is up to the managers to make decisions and allocate financial resources efficiently.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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