# Dynamics of the medical-dental relationship in a University Hospital in Buenos Aires, Argentina

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***ABSTRACT***
*Lack of communication between the medical and dental professions impacts healthcare quality, especially in hospitals. Different authors have described the oral status of inpatients. Following that line of research, the current study set the following aims: to characterize the dynamics of medical-dental healthcare interaction at a university hospital and to describe oral status and identify need for dental treatment in a sample of 150 inpatients at a hospital in Buenos Aires City, Argentina.A descriptive study was conducted on patients who were referred to dentistry by their physicians. The following variables were surveyed: personal data, medical history, oral health status, need for dental treatment and oral self-care habits.Patient median age was 60 years, 60.7% were male, 68.7% had diseases of the circulatory system, average number of medications per day was 7, of which 28.1% were for the cardiovascular system. Seventy percent of the referrals came from the Cardiology Service and 48% were requested for preoperative evaluation. Percentage of visible plaque was 73.6% and bleeding on probing 75.4%. DMFT was 19.9; 57.3% of patients had periodontal pockets deeper than 4 mm, and 97.2% required surgery, endodontic or prosthetic rehabilitation treatments. The frequency of daily brushing decreased during hospitalization: 28.7% reported not brushing daily and only 5.3% reported brushing 3 times a day. Referrals to dentistry came mainly from the cardiology service in pre-surgical situations. Inpatients presented high levels of oral pathology and need for dental treatment.*
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***Keywords:*** *referral and consultation; inpatients; oral health.*

## Dinámica de la relación médico-odontológica en un Hospital Universitario

***RESUMEN***
*La desarticulación entre la profesión médica y odontológica es un fenómeno que impacta en la calidad de atención de las personas, especialmente en ámbitos hospitalarios. Diferentes autores describieron el estado bucal de pacientes internados. Siguiendo esta línea de investigación, este trabajo estableció los siguientes objetivos: caracterizar la dinámica de la interacción medicina-odontología en un hospital universitario, conocer el estado bucal e identificar la necesidad de tratamiento odontológico en una muestra de 150 pacientes internados en un hospital de la Ciudad de Buenos Aires, Argentina. Se realizó un estudio descriptivo de los pacientes que los médicos derivaron a odontología y relevaron variables de las siguientes dimensiones: datos personales, antecedentes médicos, estado de salud bucal, necesidad de tratamiento odontológico y hábitos de autocuidado bucal. La mediana de edad fue de 60 años, el 60,7 % pertenecían al género masculino. El 68,7 % tenían enfermedades del sistema circulatorio, la media de medicamento administrada fue de 7 y el 28,1 % correspondía a medicación del sistema cardiovascular. El 70% de las derivaciones provino del servicio de Cardiología y el 48 % respondieron a evaluación prequirúrgica. El porcentaje de placa visible alcanzó 73,6 % y la hemorragia al sondaje 75,4 %. El CPOD fue de 19,9. El 57,3 % de los pacientes tenía bolsas periodontales superiores a 4 mm, y el 97,2 % requerían tratamientos de cirugía, endodoncia y rehabilitación de prótesis. La frecuencia de cepillado diario bajó durante la internación: el 28,7 % refirió no realizar cepillado diariamente y solamente el 5,3 % mencionó cepillarse 3 veces/día.*
*Las derivaciones a odontología provinieron principalmente del servicio de cardiología en situaciones prequirúrgicas. Los pacientes internados presentaron elevados niveles de patología bucal y necesidad de tratamiento odontológico.*

***Palabras clave:*** *interconsultas; derivación médica; pacientes internados; salud bucal.*

## INTRODUCTION

A number of factors contribute to the complexity of healthcare, including technology, supplies, professional qualification, habits of the population, and ways in which healthcare is organized. These components are all involved in a scenario characterized by two types of fragmentation, one of which is clearly recognized by healthcare managers and

public health experts, while the other is masked by the particular interests of the professions, creating divides between professions, and even within professions.

The first type of fragmentation characterizes healthcare in Argentina. There is a public sector in which the national, provincial and municipal levels present a high degree of autonomy; a large number of diverse "obras sociales" (trade union-managed health insurance) reflecting the development of healthcare linked to social security in Argentina, and finally, a large private sector including a wide range of mutual benefit schemes, private insurance and private facilities. There is little coordination between and even within all of these. This is true regarding both medical and dental healthcare.

The second type of fragmentation or "divide", which has high impact on personal and populational healthcare, arises from the lack of communication between medical and dental professionals. This is seen in concrete individual healthcare, in professional human resource training, and in the implementation of the concept of comprehensive health so often stated by the World Health Organization[1].

The US Public Health Service has published a critical view of emerging associations between oral diseases and systemic diseases, especially HIV and AIDS, diabetes, osteoporosis, endocarditis, adverse effects of medications, immunosuppression and nutritional deficiencies, among others[2]. There is a lack of systematic communication between medical and dental healthcare providers under the concept of comprehensive healthcare[3]. These problems in healthcare structure and dynamics may constitute one of the variables impacting patient health, taking into account the oral health problems in hospitalized patients.

The needs for dental treatment in hospitalized patients have been analyzed by different authors:

- Hanne et al. found in a hospital in Denmark that 91% of hospitalized patients needed treatment of at least one or more oral problems (dental plaque biofilm, dental caries, dry mouth) [4].
- Carrilho et al. reported that 98.1% of the patients had por oral hygiene, 74.5% had gingival inflammation, 60% periodontal disease and 19.8% candidiasis[5]. They also found the following associations:
  a. Dental caries associated to smoking and to deficient oral hygiene
  b. Gingival index and bacterial plaque index associated to hospitalization time and patient age.
  c. Increase in plaque biofilm and worsening of gingival inflammation associated to hospitalization.

- Needelman et al. found that after 14 days hospitalization in critical care units at a University Hospital in London, patients showed an increase in oral biofilm accumulation, deterioration in oral status, and increased risk of systemic infections associated to pneumonia[6].
- Tereazakis et al. conducted a systematic review which included five studies, concluding that oral health deteriorated during hospitalization in terms of plaque biofilm accumulation, gingival inflammation and alterations of the mucosa[7].
- Donatsky et al. found that 82% of inpatients at a university hospital in Denmark required dental treatment, especially surgical treatment and rehabilitation[8].

As a result of our interest in exploring the causes of these observations, we established the following aims for the current study:

- To characterize the connection between medical and dental healthcare, as expressed by referrals requested by different medical services.
- To ascertain the oral health status of patients referred to dentistry.
- To identify the needs for dental care of inpatients at a University Hospital in Buenos Aires City, Argentina.

## MATERIALS AND METHODS

The study design was approved by the Research Protocols and Ethics Committee of the Department of Research and Teaching at the Hospital Italiano in Buenos Aires (N1944) and the Bioethics Committee of the School of Dentistry of Buenos Aires University (27/03/2013-50). A descriptive study was conducted on inpatients at Hospital Italiano in Buenos Aires who were referred by treating physicians for dental evaluation, from March 2013 to May 2015. From the hospital electronic medical record (EMR), 203 patients with referrals to the Dental department were identified. Requests for

referrals are submitted by physicians, generating automatic emails to the dental department. Exclusion criteria were: patients hospitalized in the psychiatry department, patients who did not speak Spanish, patients with neurological diagnosis, patients who were unconscious and/or intubated, and patients isolated by the Infections Committee due to:

- diseases with airborne transmission or transmission by suspended particles (TBC and chicken pox)
- diseases transmitted by respiratory droplets (influenza),
- diseases transmitted by direct or indirect contact (vancomycin-resistant enterococci, *Clostridium dificile, Klebsiella pneumoniae).*

Following the above criteria, 53 patients were excluded. The sample for evaluation included 150 patients.

Data were collected according to the following procedure:

1. Email received requesting referral to dental department.
2. Patient duly identified, following the standard of the Joint Commission International[9] in the area where patient was hospitalized.
3. Clinical diagnosis performed in the hospitalization areas, using disposable dental examination instruments and a lamp protected with a disposable glove.
4. Data recorded in an *ad hoc* dental clinical history.
5. Data added to the Hospital Italiano electronic medical record.

Table 1 shows the indicators used and operationalization of the variables analyzed.

Statistic treatment for independent samples was done as follows:

- For qualitative variables, frequency distribution (%) was established.
- For quantitative variables, means, SD and SE, median, minimum and maximum were established.
- For comparison of quantitative variables, Student's test for independent samples was applied.

**Table 1: Data surveyed in clinical history.**

| Field | Indicators | Operationalization of variables |
|---|---|---|
| Personal details | Patient sex | Male/female according to patient electronic clinical history. |
| | Patient age | In years at the time of evaluation. |
| | Medical coverage | According to electronic clinical history. |
| Medical history | Main diagnosis | According to electronic clinical history. Grouped according to International Classification of diseases (WHO/ICD 9). |
| | Medication taken at time of diagnosis | According to electronic clinical history. Grouped according to criteria of Anatomical, Therapeutic and Clinical classification (WHO/ATC). |
| | Service requesting referral | According to affiliation of requesting physician to the Hospital Italiano service through an electronic Clinical History. Grouped according to HI organizational chart. |
| | Reason for referral | According to the form prepared by the physician requesting referral. |
| | Time from hospitalization to dental examination | Time (in days) from date of hospitalization to date of dental diagnosis. |
| Oral health status | Percentage of visible plaque | Absence (0) and presence (1) of visible plaque on 4 faces of teeth present (mesial, distal, buccal, lingual/palatine) observed and recorded. |
| | Percentage of bleeding on probing | Absence (0) and presence (1) of bleeding on probing observed and recorded. |
| | DMFT Index | Sum of decayed, missing and filled teeth. |
| Need for dental treatment | CPITN | Periodontal examination expressed as a score in mm of probing depth, evaluated with periodontal probe, from the gingival margin to the bottom of the periodontal pocket. Not applicable to completely edentulous patients. |
| | TNI for dental caries | Based on dental caries process established from dental chart. |
| Oral hygiene habits | Date of last visit to dentist | Direct report from patient. |
| | Frequency of oral hygiene prior to and during hospitalization | Direct report from patient. |

- For comparison of qualitative variables, Chi square test (independence test) was employed.
- For comparison of percentages between groups, independent proportions test with approximation to normal or binomial, according to the case, was applied.
- For comparison of oral hygiene methods and frequencies before and during hospitalization, Wilcoxon's test was employed.

A significance level lower than 5% was used for all cases to reject the null hypothesis.

## RESULTS

### Socio-demographic characteristics of the sample included in the study

The study included a purposive sample of 150 patients hospitalized in different departments at the Hospital Italiano in Buenos Aires. Median age was 60 years (range 21-84 years) and 60.7% were male. There was no significant difference for mean age between males and females. Ninety-eight percent of the patients had health coverage through public or private healthcare systems.

### Healthcare of referred patients

According to the ICD9 classification, main diagnoses were: diseases of the circulatory system in 68.7% of the patients (Table 2), diseases of the respiratory system in 14% and neoplasms in 9.3%. Other diseases affected 0.7% to 1.3% of the patients.

The following findings were recorded for medications taken:

- Number of medications taken daily per patient ranged from 0 to 16, with mean 7.
- Out of the total medications administered, 28.1% were for treatment of the cardiovascular system (Table 3).
- The Cardiology service was responsible for 70% (Fig. 1) of the referrals to Dentistry.
- 48% of referrals were for pre-surgical checks for cardiac vascular surgery, followed by reports required prior to transplants (Table 4).
- 10.68% of the referrals were for dental problems described with different levels of precision (dental pain, dental trauma, dental prosthesis check, Ludwig's angina, broken tooth, gum bleeding, etc.) (Table 4).
- Median time from hospitalization to dental examination was 3 days, and ranged from 1 to 123 days.

### Results of dental examination

Median was 73.6% for percentage of visible plaque and 75.4% for bleeding on probing (Table 5).

**Table 2: Main diseases grouped according to ICD9 (*).**

| | Frequency | Percent |
|---|---|---|
| Circulatory system | 103 | 68.7 |
| Respiratory system | 21 | 14.0 |
| Neoplasms | 14 | 9.3 |
| Endocrine, nutritional and metabolic | 2 | 1.3 |
| Central nervous system and sensory organs | 2 | 1.3 |
| Digestive system | 2 | 1.3 |
| Injury and poisoning | 2 | 1.3 |
| Diseases of the blood and blood-forming organs | 1 | 0.7 |
| Genitourinary system | 1 | 0.7 |
| Musculoskeletal System and Connective Tissue | 1 | 0.7 |
| Symptoms, signs that define disease | 1 | 0.7 |
| **Total** | **150** | **100.0** |

(*) International Statistical Classification of Diseases and Related Health Problems.

**Table 3: Medication administered according to ATC classification.**

| Medication administered | Percent |
|---|---|
| Cardiovascular system | 28.1% |
| Digestive system and metabolism | 19.6% |
| Blood and blood-forming organs | 18.5% |
| Nervous system | 10.5% |
| Anti-infective for general for systemic use | 5.3% |
| Dermatological medications | 5.2% |
| Respiratory system | 4.1% |
| Systemic hormonal preparations, excl. sexual hormones | 4.0% |
| Musculoskeletal system | 2.1% |
| Antineoplastic and immunomodulating agents | 1.1% |
| Genitourinary system and sexual hormones | 0.9% |
| Various | 0.3% |
| Sensory organs | 0.3% |
| Antiparasitic products, insecticides and repellents | 0.1% |

Median for DMFT index was 19.9 teeth, consisting of 2.5 decayed, 14.7 missing and 2.7 filled teeth.For CPITN, 57.3% of the sample had CPITN 3 and 4, which implies periodontal pockets deeper than 4 mm (Fig. 2).TNI for dental caries showed that 97.2% of the patients required treatment with prosthesis, endodontics and/or surgery in at least 3 quadrants of the mouth (values 5 to 11 of TNI for dental caries) (Table 6).Only 0.7% of the sample had a healthy mouth but required preventive treatment (1 on the TNI for dental caries) (Table 6).

**History of dental care in hospitalized patients**

Among the hospitalized patients, 16% reported having visited a dentist within 6 months prior to hospitalization, and 81.3% reported not having been taught oral hygiene technique.

Patients reported the following tooth brushing frequency:

- 1.3% of the patients said they "never" brushed their teeth prior to hospitalization, while 28.7% reported never doing so during hospitalization.
- 40% of the patients said they brushed their teeth "3 times a day" prior to hospitalization, but only 5.3% of patients reported doing so during hospitalization (Fig. 3).

## DISCUSSION

The aim of this preliminary study is to trigger discussion on one of the gaps in healthcare, which is comparable to the gap between knowledge production and health policy decision making, which has given rise to increasing development of translational research. The study was conducted at Hospital Italiano in Buenos Aires, which is accredited by the Joint Commission International, and according to the journal "América Economía", is ranked among the five best hospitals in Latin America, and first in Argentina[10]. Current hospital

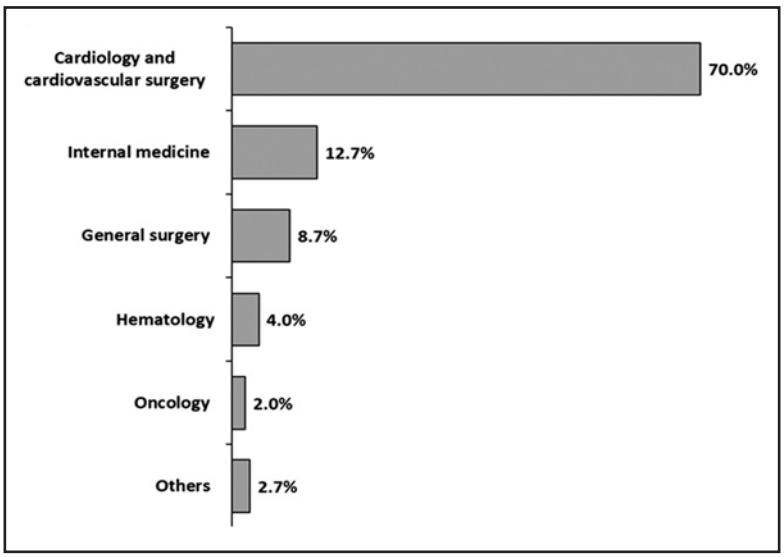


*Fig. 1: Services that requested referral to dentistry, in percentages.*

**Table 4: Reason for referral to dentistry, in percentage.**

| Reason | Percentage |
|---|---|
| Presurgical valve | 48.00 |
| Pre transplant | 39.33 |
| Dental pain | 3.33 |
| Evaluation of oral status | 3.33 |
| Dental trauma | 1.33 |
| Pre bisphosphonate evaluation | 1.33 |
| Monitoring dental prosthesis | 0.67 |
| Ludwig's angina | 0.67 |
| Broken tooth | 0.67 |
| Bleeding gums | 0.67 |
| Presurgical cardiac tumor | 0.67 |
| Total | 100.00 |

**Table 5: Description of visible plaque and bleeding on probing.**

| Percentage | Median | Mean | Maximum | SD |
|---|---|---|---|---|
| Visible plaque | 73.6 | 8.7 | 100 | 22.6 |
| Bleeding on probing | 75.4 | 10.0 | 100 | 56.6 |

**Table 6: Percentage of TNI for dental caries.**

| TNI for dental caries | Description | Percentage |
|---|---|---|
| 1 | Healthy mouth with need for preventive treatment | 0.7 |
| 2, 3, 4 | Dentin-enamel Caries | 2.1 |
| 5 | Pulp problems | 1.3 |
| 6 a 10 | Partially edentulous | 85.3 |
| 11 | Completely edentulous | 10.6 |

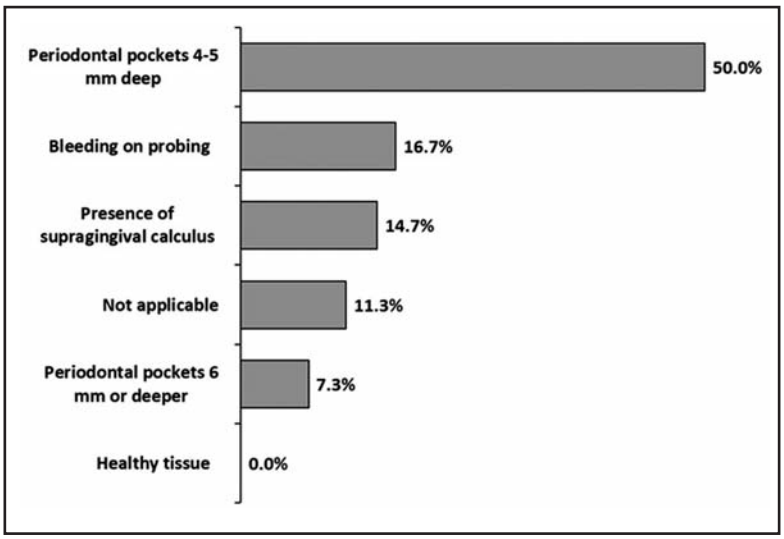


*Fig. 2: Percentages of community periodontal index of treatment needs (CPITN).*

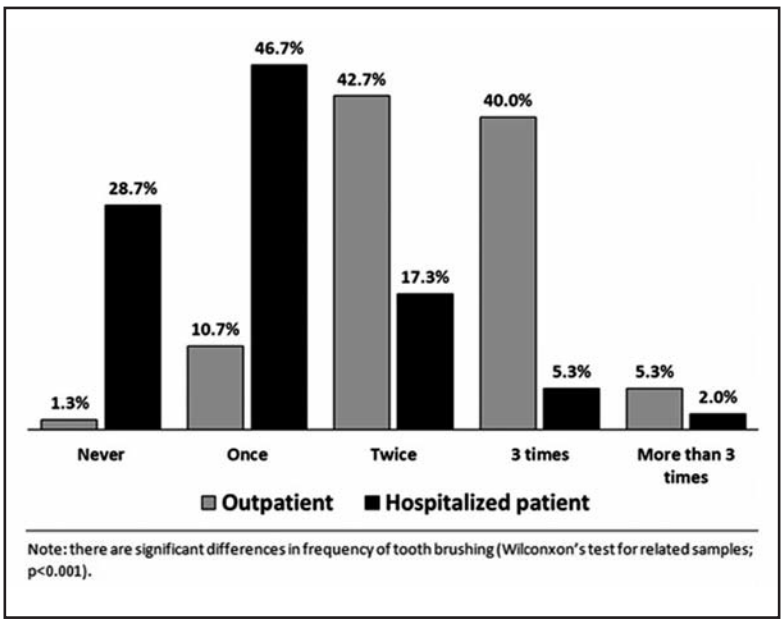


*Fig. 3: Comparison of daily hygiene habits before and during hospitalization, in percentages.*

policies on initial evaluation of hospitalized patients include assessment of medical, nursing and nutritional areas. The medical area includes referrals to the different services that physicians deem necessary for adequate patient care. Dentistry has been included in the hospital organizational chart with direct dependence on the Surgical Department.The reasons supporting the need for a change in the dynamics of patient healthcare, in the hope of generating a new paradigm in comprehensive healthcare, can be found in scientific evidence. On an individual scale, they include:

1. General diseases or treatments for them with repercussion or manifestations on oral status, and
2. Oral diseases or treatments related to them with repercussion or manifestations on general health.

At the same time, on the healthcare scale, there is a contradiction between the "discourse" and the concrete practice of professional integration. From an epidemiological standpoint, it has been demonstrated that dental caries and periodontal disease are prevalent and could be avoidable[11-12]. Deficient oral hygiene contributes to the development and maturation of dental plaque biofilm, with impact on prevalent diseases. The etiological character of plaque biofilm warrants a re-evaluation of its role in specific prevention. Carrilho N et al. [5] suggest that there may be loss of motivation in maintaining routine hygiene habits such as tooth brushing. Needelman et al. [6] report that as a result of preexisting oral health conditions, problems may become more severe or new problems may arise upon hospitalization, such as infections of the respiratory tract caused by oral microorganisms.

Our results on deficient oral hygiene and consequent presence of biofilm were consistent with those reported in the studies by Carrilho *et al.* [5], Needleman *et al.* [6] and Terezakis *et al.* [7].

This deterioration process can increase as a result of preexisting systemic condition or due to the use of medication administered during hospitalization. Moreover, the impact of emotional conditions that arise during hospitalization is not negligible.

Despite available evidence, no systematic protocol has been implemented to include oral hygiene practice in nursing routines or the routine of caregivers of hospitalized patients.

With regard to established oral diseases, diagnosis performed on the sample of hospitalized patients showed a major sanitary deficiency reflected by indicators of current status as well as need for treatment. It is worth highlighting that 98% of the patients in this study had medical coverage through private systems or "obras sociales" (union-managed health insurance), which included treatment of diseases due to dental plaque biofilm. It is interesting to note that, notwithstanding, only 2.8% had a healthy mouth, while 97.2% had need for oral treatment of caries and gingival-periodontal diseases. The high level of oral disease found in this study is in agreement with the results published by Hanne *et al.* [4], Carrilho *et al.* [5] and Donatsky *et al.* [8].

With regard to the origin of the referrals, there are marked differences between those requested by cardiologists, particularly in pre-surgical situations, and those requested by the rest of the medical specialties.

However, given the chronic inflammatory component of oral diseases, dental referral ought to come from most medical services provided in a hospital, because such diseases may constitute a risk factor for the diseases dealt with by the different specialties.

Dental referral may reflect the degree of interdisciplinarity at a facility and should involve all healthcare professionals in order to optimize the quality of patient healthcare.

Clearly, there is no such thing as "partial health". Oral status is a component of general health. The causes of the "gap" between medicine and dentistry may be found in the corporative autonomies historically developing as from human resource training.

With the aim of proposing changes and improvements in the integration of dentistry in a hospital, we propose further studies to analyze intrahospital medical referrals to the dental department and the existence of protocols or policies of intrahospital oral hygiene, as well as levels of compliance.

Finally, we recommend:

a. Protocolizing the care of hospitalized patients based on a risk approach,
b. Fostering self-care actions to be used to prevent this scenario, and
c. Moving forward in interdisciplinary social practices in healthcare training courses.

## CONCLUSIONS

The dental referrals recorded were mainly requested by the cardiology department, particularly for pre-surgical situations.

The oral status of hospitalized patients surveyed in this sample reveals a major gap in care, with no significant difference between sexes.

Patients included in this sample were found to have high levels of need for dental treatment.

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