“The Use Of Information And Communication Technologies In Latinamerican Dentists: A Cross-Sectional Study”

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Abstract
Objectives: The use of Information and Communication Technologies (ICTs) allows people to communicate in "real-time". The popularity of these tools has created a need for healthcare providers to have an online presence and interact with their patients via an increasing number of channels. The purpose of this study was to assess the frequency of use, perceptions, and barriers of ICTs among Ecuadorian dentists.

Methods: An anonymous, cross-sectional survey-based study was conducted among 342 Ecuadorian dentists. The questionnaire included 13 items related to the frequency of use, perceptions and barriers of ICTs among dentists.

Results: Almost all participants reported communicating with colleagues (99.7%) and with patients (96.2%) using ICTs. In contrast, academic information searching was the least used application, with 36.5% (n = 125) of respondents indicating no ICT use for this purpose. WhatsApp was overall the most used ICT with 97.4% of participants using it to contact colleagues and 93.6% to contact patients. Similarly, Facebook was used by 88.0% (n = 301) of dentists to interact with colleagues while 67.8% did so with patients. More than 90% (n = 308) of dentists perceived that ICTs are useful for health and service promotion, getting involved in research projects, solving daily clinical cases, working in groups and finding new job opportunities. Regarding barriers, privacy was the biggest concern among dentists, with 65.2% (n = 223) agreeing that it is an issue concerning ICT use. The second most frequent barrier was time, with 48% (n = 164) of respondents considering not having enough time to use ICTs.

Conclusions: We found that Ecuadorian dentists had high usage of ICTs, mainly for communication among professionals and communication with their patients. Academic information searching remains a comparatively underused application of these tools. Most participants had a positive perception of ICTs in the dentistry practice, particularly younger dentists. Furthermore, dentists had a positive perception of ICTs. Finally, privacy remains the main barrier for ICT adoption according to our survey.

Introduction
The use of Information and Communication Technologies (ICTs) allows people to interact in ‘real-
time’, influencing how and with whom people communicate. The application of ICTs to healthcare constitutes a new domain called e-health (1). The popularity of these tools has created a need for healthcare providers to have an online presence and interact with their patients via an increasing number of channels. Furthermore, patients are also using social media as a tool to connect with other patients and create a support network of individuals living with similar conditions (2). This has created a new paradigm in which patient interactions extend beyond the confines of the office visit (3).

In emerging societies digital technologies, particularly, smartphones have been adopted extensively. In 2018, 41.4% of the Ecuadorian population owned a smartphone, up from 6.2% in 2012, while mobile devices accounted for approximately 24% of web traffic in the country (4). This has allowed communities to leapfrog barriers related to the installation of infrastructure, allowing them to participate in the digital environment. The World Health Organization (WHO) considers that developing the infrastructure of ICTs for the healthcare system is essential to promoting equitable, affordable, and universal access. Furthermore, the American Dental Education Association (ADEA) considers communication skills as a core area in behavioural sciences in the dental curriculum, and recently defined standards for teaching and assessing competencies in communication skills for patient education and health promotion (5).

The increased use of these tools and specifically the wealth of information available online has changed the behaviour of many patients. This new patient group called the e-patients, also referred to as internet patients, are actively engaged in their health care and health decision making processes. They value above all else autonomy, choice, and vigorously perform their health information-gathering online (6). There is evidence showing that e-patients have refused or terminated recommended dental treatments because of the information they found online (7).

Therefore, the role of dentists in health communication is changing, and they need to leverage ICTs to improve communication with their partners and patients. However, little is known about the frequency and preference of ICTs among Latin-American dentists. Our study aims to fill this gap by assessing different aspects related to ICTs, such as the frequency of use, perceptions and barriers. Our goal is to provide data that generates insights to facilitate the implementation of ICTs into real-life dentistry
practices.

Materials And Methods
Study design and Population

An anonymous, cross-sectional survey-based study was completed by 342 Ecuadorian dentists. We adapted the questionnaire from a previous survey used in physicians (8). The questionnaire surveyed demographic characteristics and recorded the frequency of use, perceptions and barriers of ICTs using a 5-point Likert scale. Frequency of use responses for each ICT ranged from “Never” to “Daily Use”. Perceptions and barriers for ICTs were recorded using a 5-point Likert scale ranging from “Strongly Disagree” to “Strongly Agree”. The ICTs recorded were classified according to their intended use: “Communicating with Patients”, “Interacting with patients”, “Communicating with Colleagues”, “Interacting with Colleagues” and “Academic Information Searching”.

The ICTs included in the questionnaire for “Communicating with Patients” and “Communicating with Colleagues” were SMS, email, Line, WhatsApp, Hangouts, Vibe, Facebook messenger, and Telegram. For “Interacting with patients” and “Interacting with Colleagues” Blogger, Facebook, Google Plus, Instagram, Snapchat, Tumblr, Twitter, and YouTube were included. Finally, for “Academic Information Searching” we included Academia.edu, Google Scholar, Medscape, PubMed, ResearchGate, Scopus, UpToDate, and Cochrane.

Ethical Considerations

The study was approved by the ethics committee ‘Comité de ética e Investigación en Seres Humanos (CEISH)’. The survey was anonymous, and the identity of dentists who participated in the study was not revealed and personal data protection was conserved. Written informed consent for the use of the information recorded was obtained before participating in the survey.

Statistical Analysis

Demographic data was explored by calculating frequencies and percentages for categorical variables and mean and standard deviation (SD) for continuous variables. According to the distribution, age was dichotomized as less than 33 years old and equal to or more than 33 years old. Similarly, years of practice were dichotomized as less than 8 years and equal or more than 8 years. Items pertaining to perceptions and barriers upon the use of ICTs were dichotomized into “disagree”
(strongly disagree and disagree) or “agree” (neutral, agree and strongly agree). ICTs were grouped according to their intended use. For each ICT, frequency of use was divided between “No Use”, “Low Frequency”, and “High Frequency”. If a respondent recorded “High Frequency” on any ICT within a use group, they were classified as a High Frequency user for that purpose. If no instances of “High Frequency” were found, responses were checked for instances of “Low Frequency” and classified accordingly. Otherwise, the respondent was classified as “Non-User” for that group of ICTs.

In order to perform the multivariate analysis, the frequency of use of ICTs for each intended purpose were dichotomized between User and Non User for “Communicating with Patients”, “Communicating with Colleagues”, and “Interacting with Colleagues”. On the other hand, “Interacting with patients” and “Academic Information Searching” were was dichotomized between “High Frequency” and “No use/Low Frequency” because there were an insufficient amount of cases of “Non Users” in these groups.

Bivariate analysis was performed between independent variables by using chi-squared testing to explore the association between the independent variables (age, gender, postgraduate years, location, type of institution, specialist degree), and the intended use of ICTs, as well as to characterize perceptions and barriers of ICT use. Variables with a significant p value were selected for regression analysis. Generalized linear models were created for each ICT use, perception and barrier. Odd ratios and 95% confidence intervals were computed. A p value < 0.05 was considered significant for the final analysis. All data was analysed using Rstudio and Ggplot.

Results
342 participants were included in the final analysis. The mean age was 37 years, with 12.4 years of practice as average. Female dentists represented 51.8% of the sample. Most participants were general dentists (61.1%), worked in private service (67%) and in an urban setting (93%). Regarding access to smartphones, 97.66% of dentists reported owning one. Demographic characteristics are presented in table 1.

Frequency of use of ICTs
WhatsApp was the most used ICT with 97.4% of participants using it to communicate with colleagues,
and 93.6% with patients. Similarly, Facebook was used by 88.0% (n = 301) of dentists to interact with colleagues, while 67.8% did so with patients. The frequency of use of all ICTs is depicted in table 2. ICTs for academic purposes had lower usage rates compared to other categories. The most frequently used platform for academic purposes was PubMed, which was used by 42.7% (n = 146) of respondents, while UpToDate was only used with by 4.4% of surveyed participants.

The frequencies of use of ICTs for each studied purpose are depicted in Fig. 1. Almost all participants reported communicating with colleagues (99.7%) and with patients (96.2%) using ICTs. In contrast, academic information searching was the least used application, with 36.5% (n = 125) of respondents indicating no ICT use for this purpose. Similarly, 23.68% (n = 81) of respondents reported not interacting with patients through ICTs.

More than 90% (n = 308) of dentists agreed ICTs are useful for health and service promotion, getting involved in research projects, solving daily clinical cases, working in groups and finding new job opportunities. Regarding barriers, privacy was the biggest concern among dentists, with 65.2% (n = 223) agreeing that it is an issue concerning ICT use. The second most frequent barrier was time, with 48% (n = 164) of respondents considering not having enough time to use ICTs. A difficult internet connection and no internet connection were perceived as a barrier by less than a third of respondents (Fig. 3).

Chi Square testing was performed to identify relationships between demographic variables and the use, perceptions and barriers of ICTs. Variables with a p-value below a threshold of 0.05 were included for further analysis. Individual bivariate analysis results are recorded in the Supplemental Appendix. The findings of the multivariate analysis are summarized in Tables 4, 5 and 6.

Regarding ICT uses, specialists were more likely (OR = 4.60, p < 0.01, 95%CI: [2.59–8.47]) to use ICTs for academic purposes. On the contrary, having more than 8 years of experience was related to the opposite trend (OR = 0.271, p = 0.010, 95% CI: [0.097–0.727]), it was also associated with a reduced likelihood of using ICTs for patient interaction ((OR = 0.38, p = 0.030, 95%CI: [0.154–0.912]). An increased likelihood of ICT use for patient communication was noted among female dentists (OR = 2.81, p < 0.01, 95%CI: [1.46–5.65]) Specialists (OR = 3.14, p < 0.01, 95%CI: [1.47–7.32]) and those
working in private institutions OR = 2.17, p = 0.02, 95%CI: [1.14–4.16])

Analysis of perceptions and barriers showed that dentists working in private institutions were more likely to agree that ICTs are useful to self-promoting (OR = 5.48, p < 0.01, 95% CI: [2.05–16.9]), solving clinical cases (OR = 2.51, p = 0.01, 95%CI: [1.28–4.96]), and working in group (OR = 2.25, p = 0.04, 95%CI:[1.04–4.87]). The type of institution had no significant statistical association with any of the barriers presented.

Female dentists were more likely to agree that ICTs are useful for working in group (OR = 3.44, p = 0.01, 95% CI: [1.5–8.92]) and health promotion (OR = 5.74, p < 0.01, 95%CI: [2.32–17.4]). Concerning barriers, being female was associated with an increased likelihood of considering privacy a barrier for ICT use (OR = 1.89, p = 0.01, 95% CI: [1.19–3.03]), having no internet access (OR = 1.91, p = 0.02, 95%CI:[1.13–3.25]), and difficult internet access (OR = 2.1, p < 0.01, 95%CI: [1.28–3.49]).

Dentists older than 33 years of age had an overall less favourable perception of ICTs, represented by the reduced likelihood to preferring ICTs to Traditional channels (OR = 0.4 p < 0.01 [95%CI 0.215, 0.725]). Regarding barriers, this group was more likely to be concerned with privacy (OR = 1.84, p = 0.01, 95%CI: [1.16–2.94]), not having internet connection (OR = 2.14, p = 0.01, 95%CI: [1.22–3.8]), and not having enough time to use ICTs (OR = 1.94, p < 0.01, 95%CI: [1.24–3.05])

Discussion

The purpose of this study was to assess the use, perceptions, and barriers of ICTs among a sample of Ecuadorian dentists. It is relevant to note that virtually all surveyed dentists used at least one ICT platform. This shows that dentistry has adopted the use of ICTs to share deals and promotions, networking, providing customer service, and advertising dental practice with patients. The frequency of use of social media has been previously reported to be between 51–76% of dentists using ICTs for professional purposes (9). In contrast, 95.3% of our respondents used ICTs for this end. In previous publications, patients gave high satisfaction scores when dental care providers use ICTs for patient communication (10). In accordance with this fact, 96.2% of respondents reported using ICTs to communicate with patients. In our study, the most used application for this purpose was WhatsApp (83.9%). Similarly to our results, Ganasegeran and colleagues found that almost 70% of surveyed
health professionals perceived this application as beneficial during practice (11).

The biggest social media platform currently available is Facebook. It allows for complex social interactions with anybody who shares similar interests (12). In agreement with recent studies (13), our results found that Facebook is the most used ICT for patient (67.8%) and colleague interaction (88%). The widespread adoption of this platform makes it an attractive mean of interacting with anyone and efficiently sharing dental care information. However, Facebook has been widely criticized for mismanaging user information (13), which should be of concern considering that more than two thirds (65.2%) of those surveyed agreed that lack of privacy is a barrier for ICT use.

More than two-thirds of our respondents used ICTs to search for academic information. The Internet is an essential tool for healthcare professionals to improve their knowledge and to acquire updated information about health care and their profession. This raises an important point regarding the quality of evidence that ends up being transformed into practice. Systematic reviews and Synopses of studies provide an assessment of original work or a summary of many studies. However, only 7% of the participants responded that they frequently use this tool. This fact is not surprising because, in physicians, a very small use frequency has been reported (1.8%) (14). Non appraised primary studies are the basic academic information source. Despite the importance of this type of resource, 88% of those surveyed reported not using these tools. This trend is similar to the rates found in physicians, where it has been reported that up to 80% does not use PubMed on a regular basis (8).

Regarding perceptions of ICTs, most dentists agree that they can be useful in health promotion (90.1%) and self-promoting dental services (91%). ICT platforms allow for an ever increasing amount of data to be shared, transforming the way patients approach and manage their care. This in turn leads in changes in patient expectations (15) which dentists must be able to identify and adapt to in to be able to leverage them into increasing patient satisfaction.

Privacy and patient confidentiality are regarded as the most significant barriers to m-Health implementation in regions such as Europe and America (16). As seen in Fig. 3, privacy is the biggest concern among dentists in our study, with more than two-thirds of respondents agreeing with this statement. The issue of patient privacy expands well beyond the domain of the dentistry practice, this
is why it is essential for both ICT providers and healthcare practitioners to work together in order to ensure that patient information is only accessed by authorised individuals (15). There are solutions for many aspects of patient information security currently being explored by researchers in order to preserve patient information and ensure privacy and confidentiality (17).

Another interesting fact is that Internet access is no longer seen as a barrier for ICT use in our study, Internet access and reliability was a barrier for less than a third of dentists. In contrast, a previous study in Latin-American found that 80% of respondents reported not having a good connection (18). This is related to the fact that there is an ongoing expansion in mobile phone usage in Latin America (19). In developing societies, the adoption of new technologies often yield increased benefits by leapfrogging the need to implement infrastructure and enabling the distributed implementation of new strategies (20, 21).

As shown on table 5 private dentists were more than 5 times more likely to perceive that ICTs can be useful to self-promote their services. They were also more likely to use these platforms to work in group and solve clinical cases. This can be related to the need of private dentists to adapt to evolving patient preferences and the fact that ICTs can offer tools which provide a competitive advantage (22).

In contrast, older dentists have a less favourable view of some aspects of ICTs use when compared to their peers. The differences in perceptions can be attributed to what is known as the digital divide (23). This concept relates to the fact that users born in the digital era are more familiar with the internet and computers in general, therefore, they adopt technologies at a faster rate than their older peers (24).

Our results confirm that it is necessary to improve knowledge about the benefits and adequate use of Evidence-Based Resources and increase their use. ICTs can be used in multiple facets of dentistry such as in postgraduate and continuing education. Its use has increased for some years, turning into an affordable way to advertise a dental practice (25).

Strengths and Limitations
One of the main strengths of this study is that it covered a large sample size of dentists. The sample included participants of different ages, gender, and practices. Our study has some limitations. Firstly,
it was not conducted in all Latin American countries, and preferences and frequency of use of ICTs could differ significantly, for instance, we cannot generalize our results to all Spanish-speaking dentists. Secondly, it is a cross-sectional study, and therefore, cause and effect relationships cannot be made. Furthermore, our participants knew the purpose of the research and could have affected the answers that some of them gave. Thirdly, the study design does not allow for causality to be established and there are many other possible factors that were not considered and might constitute a confounding effect not accounted for. To the best of our knowledge this is the first study that assesses uses, preferences and barriers of ICTs in Latin American dentists

Conclusion
The use of mHealth technologies provide tools which enable fast, reliable communications and the transfer of information between dental professionals and their patients. We found that Ecuadorian dentists had high usage rate of ICTs, mainly for communication among professionals and communication with their patients. Academic information searching remains a comparatively underused application of these tools. Furthermore, dentists had a positive perception of ICTs. Finally, privacy remains the main barrier for ICT adoption according to our survey.

Our study raises an important point regarding the gap between the perception and real-life use of ICTs for academic purposes and the use of Evidence-based Resources in practice. The responsibility of fomenting use of this tools falls on dentistry faculties and societies who must develop educational programs to increase the availability of evidence based tools and determine what content is required and advisable to improve Dental Continuous education. Further work is required to expand on our findings on the issues identified in order to accelerate ICT adoption in dental care for the benefit of the patient.

Abbreviations
Information and communication technologies (ICTs); short message service (SMS); Comité de ética e Investigación en Seres Humanos” (CEISH)

Declarations
1. Ethics approval and consent to participate: This study was approved by the ethics committee Comité de Ética e Investigación en Seres Humanos (CEISH), Guayaquil-Ecuador, in accordance with
the principles established by the declaration of Helsinki.

2. **Consent for publication:** Not applicable

3. **Availability of data and materials:** The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

4. **Competing interest:** The authors declare no conflicts of interest related to this work.

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6. **Author’s contributions:** The design, acquisition, analysis and interpretation of data was performed with substantial contributions from all participating authors. ICO and CV drafted the manuscript and revised it based on critically important input from EV, MF, VM. The statistical analyses were performed by CV and PC. Gj and AG drafted the tables and figures. The final draft of the manuscript was developed with input from EV, CV, ICO, and EF. All authors read and approved the final version.

7. **Data Availability:** Data stored, used and/or analysed for the present study are available from the corresponding author on reasonable request.

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Tables

Table 1. General characteristics of the surveyed population (n=342)

| Characteristics                          | n (%)     |
|------------------------------------------|-----------|
| Age, mean (SD)                           | 37.3 (11.7) |
| Years of experience, mean (SD)           | 12.4 (11) |
| Gender                                   |           |
| Male                                     | 165 (48)  |
| Female                                   | 177 (52)  |
| Type of institution                      |           |
| Public                                   | 113 (33)  |
| Private                                  | 229 (67)  |
| Location                                 |           |
| Urban                                    | 318 (93)  |
Rural Practice

General dentist 209 (61)
Specialist 133 (39)

Notes: SD, standard deviation

Table 2. Frequency of use of ICTs classified by intended use

| ICT                      | Frequency(%) | ICT                      | Frequency(%) |
|--------------------------|--------------|--------------------------|--------------|
| Communicating with Colleagues |              | Communicating with Patients |              |
| Whatsapp                 | 333 (97.4)   | WS                       | 320 (93.6)   |
| Mail                     | 320 (93.6)   | Mail                     | 240 (70.2)   |
| SMS                      | 196 (57.3)   | SMS                      | 235 (68.7)   |
| Facebook_M               | 195 (57.0)   | Facebook_M               | 185 (54.1)   |
| Line                     | 23 (6.7)     | Line                     | 10 (2.9)     |
| Hangouts                 | 21 (6.1)     | Hangouts                 | 4 (1.2)      |
| Telegram                 | 7 (2.0)      | Telegram                 | 4 (1.2)      |
| Vibe                     | 6 (1.8)      | Vibe                     | 3 (0.9)      |
| Professional Contact     |              | Interacting with Patients |              |
| Facebook                 | 301 (88.0)   | Facebook                 | 232 (67.8)   |
| YouTube                  | 267 (78.1)   | Instagram                | 198 (57.9)   |
| Instagram                | 261 (76.3)   | YouTube                  | 73 (21.3)    |
| Twitter                  | 139 (40.6)   | Twitter                  | 61 (17.8)    |
| GoogleP                  | 63 (18.4)    | GoogleP                  | 26 (7.6)     |
| Snapchat                 | 38 (11.1)    | Snapchat                 | 18 (5.3)     |
| Blogger                  | 11 (3.2)     | Blogger                  | 3 (0.9)      |
| Tumbler                  | 8 (2.3)      | Tumbler                  | 0 (0.0)      |
| Academic Information Searching |        |                          |              |
| PubMed                    | 146 (42.7)   |                          |              |
| Medscape                  | 87 (25.4)    |                          |              |
| Google_Scholar           | 80 (23.4)    |                          |              |
| Academia.edu             | 75 (21.9)    |                          |              |
| Cochrane                 | 49 (14.3)    |                          |              |
| Scopus                   | 43 (12.6)    |                          |              |
| Researchgate             | 40 (11.7)    |                          |              |
| UptoDate                 | 15 (4.4)     |                          |              |
### Table 3 Generalized logistic regression analysis of ICT Uses

| Predictor         | Independent Variable       | OR   | 95% CI          | P Value |
|-------------------|-----------------------------|------|-----------------|---------|
| Patient_Comunication | Gender = Female             | 2.81 | [1.46 - 5.65]   | 0       |
|                   | Institution = Private       | 2.17 | [1.14 - 4.16]   | 0.02    |
|                   | Practice = Specialist       | 3.14 | [1.47 - 7.32]   | 0       |
| Prof_Contract     | Years of Experience > 8    | 1.14 | [0.371 - 3.63]  | 0.82    |
|                   | Age > 33                    | 2.15 | [0.684 - 6.85]  | 0.19    |
| Academic_Use      | Years of Experience > 8    | 0.27 | [0.097 - 0.727] | 0.01    |
|                   | Age > 33                    | 0.71 | [0.264 - 1.94]  | 0.5     |
|                   | Institution = Private       | 1.58 | [0.913 - 2.70]  | 0.09    |
|                   | Practice = Specialist       | 4.6  | [2.59 - 8.47]   | 0       |
| Patient_Interaction | Years of Experience > 8    | 0.38 | [0.154 - 0.912] | 0.03    |
|                   | Age > 33                    | 0.86 | [0.356 - 2.11]  | 0.73    |
|                   | Institution = Private       | 2.45 | [1.50 - 4.01]   | 0       |
| Prof_Interaction  | Years of Experience > 8    | 0.97 | [0.368 - 2.53]  | 0.98    |
|                   | Age > 33                    | 0.97 | [0.369 - 2.55]  | 0.95    |
|                   | Institution = Private       | 1.04 | [0.593 - 1.79]  | 0.89    |
### Table 4: Generalized logistic regression analysis of ICT Perceptions

| Group                          | Independent Variable | oddsratio | 95% CI       | P   |
|--------------------------------|----------------------|-----------|--------------|-----|
| Continual Dental Education     | Ag e> 33             | 0.16      | [0.039 - 0.688] | 0   |
|                                | 2Years_practice > 33 | 2.37      | [0.594 - 8.41] | 0   |
|                                | Gender = Female       | 1.55      | [0.668 - 3.81] | 0   |
| Searching for New Opportunities| Ag e> 33             | 0.14      | [0.034 - 0.568] | 0   |
|                                | Years of Experience > 8 | 2.7     | [0.679 - 9.4] | 0   |
| Health Promotion               | Ag e> 33             | 0.55      | [0.14 - 2.13] | 0   |
|                                | Years of Experience > 8 | 0.63     | [0.161 - 2.26] | 0   |
|                                | 3Gender = Female      | 5.74      | [2.32 - 17.4] | 0   |
| Working in Group               | Gender = Female       | 3.44      | [1.5 - 8.92] | 0   |
|                                | Institution = Private | 2.25      | [1.04 - 4.87] | 0   |
| Prefer ICTs to Traditional Channels | Ag e> 33           | 0.4       | [0.215 - 0.725] | 0   |
|                                | 2PracticeSpecialist   | 0.94      | [0.522 - 1.69] | 0   |
| Service Self Promotion         | Ag e> 33             | 0.01      | [0 - 0.139] | 0   |
|                                | Years of Experience > 8 | 2.36     | [0.313 - 13.2] | 0   |
|                                | Practice = Specialist | 5.37      | [1.81 - 20] | 0   |
|                                | Institution = Private | 5.48      | [2.05 - 16.9] | 0   |
| Resolving Clinical Cases       | Ag e> 33             | 0.53      | [0.256 - 1.05] | 0   |
|                                | Institution = Private | 2.51      | [1.28 - 4.96] | 0   |
Table 5 Generalized logistic regression analysis of ICT Barriers

| Group       | Independent Variable | odds ratio | 95% CI        | P value |
|-------------|----------------------|------------|---------------|---------|
| Privacy     | Ag e> 33             | 1.84       | [1.16 - 2.94] | 0.01    |
|             | Gender = Female      | 1.89       | [1.19 - 3.03] | 0.01    |
| No Internet | Ag e> 33             | 2.14       | [1.22 - 3.8]  | 0.01    |
|             | Practice = Specialist| 0.35       | [0.182 - 0.635]| 0       |
|             | Gender = Female      | 1.91       | [1.13 - 3.25] | 0.02    |
|             | Institution = Private| 0.79       | [0.451 - 1.41]| 0.42    |
| Difficult internet | Practice = Specialist| 0.37     | [0.206 - 0.653]| 0       |
|             | Gender = Female      | 2.1        | [1.28 - 3.49] | 0       |
|             | Institution = Private| 0.6      | [0.356 - 1]   | 0.05    |
| Time        | Ag e> 33             | 1.94       | [1.24 - 3.05] | 0       |
|             | Practice = Specialist| 0.5       | [0.316 - 0.797]| 0       |

Table 6, mentioned on page 9, was omitted by the authors in this version of the paper.

Figures
Figure 1

Frequency of use of information and communication technologies for professional contact, interaction and academic searches among Ecuadorian dentists.
Figure 2

Frequency of use of information and communication technologies for patient contact and interaction.
Perceptions of information and communication technologies by Dentists. Each perception is represented by one vertex. All proportions depicted are individuals that agree with the statement. I - Facilitates continual odontology education II - Working in teams with colleagues III - Self Promotion of odontology services IV - ‘Search for new job opportunities and/or professional development’ V - Resolving Clinical Cases VII - I prefer the use of information and communications technology to traditional means of communication VII - Participate in Research VIII - Health Promotion
Figure 4

Barriers of information and communication technologies in nurses. Each barrier is represented by one vertex. All proportions depicted are individuals that agree with the statement. I, ‘Concerned about privacy or security about personal and/or patient information’ II, ‘Do not have access to mobile internet’ III, ‘Do not have access to the internet at work’ IV, ‘Do not have enough time to neither learn how to use them or use them’

Supplementary Files
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Addional File 1.odt