

## INDEPENDENT DENTISTS' KNOWLEDGE ON PATIENT SAFETY AND REPORTING OF ADVERSE EVENTS. MEDELLÍN, COLOMBIA, 2017

NATALIA CALLE-HENAO<sup>1</sup>, PAULA CAROLINA HERNÁNDEZ-PINILLOS<sup>1</sup>

**ABSTRACT. Introduction:** In Colombia, the Comprehensive Health Services Qualifying System (Sistema Único de Habilitación de Servicios de Salud) has been revised several times. It is currently governed by Resolution 2003 of 2014, which includes dentists as independent professionals who must abide by its content. This regulation considers healthcare quality in relation to patient safety as a key aspect for professional practice. The goal of the present study was to determine the associations between dentists' sociodemographic characteristics, their knowledge on patient safety, and the reporting of adverse events with the patient safety perception by independent providers of the dental services in the city of Medellín. **Methods:** This is a descriptive, cross-sectional, analytical study in 215 independent dentists from Medellín; an empirical analytical approach was used for data collection, conducting univariate, bivariate, and multivariate statistical analysis. **Results:** of the population of dentists studied, 52.1% were female and 50% were 41 years or younger. The variables with statistically significant association regarding dentists' perception on patient safety were: pursuing patient safety studies after graduation, having full qualifying standards, and have performed more than one corrective action of adverse events over the past year. **Conclusions:** Independent dentists generally lack knowledge on adverse events management and patient safety practices. Universities and monitoring and control bodies can promote theoretical and practical activities to improve these aspects and thus the safety of dental patients.

**Key words:** patient safety, quality, medical errors, health services

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<sup>1</sup>MA in Health Quality, Universidad CES

## INTRODUCTION

Patient safety—understood as the set of structural elements, processes, instruments and methodologies based on scientifically proven evidence tending to minimize the risk of suffering adverse events in the healthcare process or mitigate its consequences—is an increasingly relevant concept among the different modalities of health services provision worldwide.<sup>1</sup> To successfully identify adverse events, evaluate their causes, promote strategies to mitigate their incidence and, consequently, improve quality in patient care, represents a huge progress for different healthcare systems; however, it is a process that takes time to know and to adapt to each country's conditions.

In 2004, the World Health Organization (WHO) created the World Alliance for Patient Safety to promote worldwide efforts to improve patient-care safety among member countries.<sup>2</sup>

Colombia has been working on patient safety since the emergence of the Enforced Quality Assurance System (*Sistema Obligatorio de Garantía de la Calidad*), initially contained in Decree 1011 of 2006 and now included in Decree 780 of 2016. In 2008, a patient safety policy was issued, which is transversal to the four components of the Enforced Health Quality Assurance System (*Sistema Obligatorio de Garantía de la Calidad en Salud, SOGCS*).<sup>3-5</sup> However, independent healthcare providers, who represented a significant percentage of health service providers by the time the standard was issued, were not forced to abide by this policy.

Adverse events are described as any unintentional harm or damage caused to patient due to the intervention instead of the basal disease. These in turn can be classified into preventable and non-preventable adverse events.<sup>6</sup> The methodologies used for adverse events analysis include the London Protocol, root cause analysis, and the failure mode and effects analysis (FMEA).<sup>1</sup>

In its most recent reform, set forth in Resolution 2003 of 2014, the Comprehensive Qualifying System (*Sistema Único de Habilitación*)—a basic component of the SOGCS—includes a standard for priority processes aimed at independent providers (both general and independent dentists) to establish and consciously take ownership of everything related to patient safety in order to provide better, quality healthcare services.<sup>7</sup>

According to data from the Sistema Nacional de Información de la Educación Superior (SNIES), by 2014 there were 31 dental schools in Colombia, and by 2012 a total of 13,599 dentists had graduated,

which means a dentist for every 3,300 inhabitants. The latest report published by this body shows that 14,181 dentists have graduated nationwide, averaging close to 1,380 graduates per year.<sup>8</sup> This suggests that there is a considerable increase in dentists, many of whom exercise their profession through private services, so it is pertinent to follow up and analyse the aspects concerning this healthcare service.

According to reports from the Ministry of Health of Antioquia, by the year 2016 alone there were 1,699 independent dental professionals registered in the city of Medellín,<sup>9</sup> meaning that the city has a significant number of professionals offering dental care, who are generally under-researched.

In consequence, the objective of this study was to determine the association between sociodemographic characteristics, knowledge on patient safety and the reporting of adverse events with the perception of patient safety in independent dental service providers in Medellín. This study set out to investigate the management of patient safety in independent dentists in Medellín to promote the continuous improvement of health care and to expand this information to other areas of the country, in order to produce gradual changes.

## METHODS

An observational, descriptive, cross-sectional, analytical study was conducted in a sample for convenience of 215 independent dentists from the city of Medellín, registered in the Special Registry of Health Service Providers (*Registro Especial de Prestadores de Servicios de Salud, REPS*); the professionals agreed to participate in the study voluntarily.

A sample size of 215 dentists was calculated, taking into account the criteria for a descriptive study, as well as a population of 1,699 dentists registered in Medellín's REPS by May 2016, with a confidence interval level of 95% and an expected proportion of 80% of dentists' positive patient safety perception.

The inclusion criteria limited the participation of dentists active in the REPS, who were registered as independent professionals in Medellín and agreed to participate providing an informed consent prior explanation of the research process, the absence of risks, and its contribution to improving dental care quality, considering the current regulations. Dentists who did not agree to participate in the study were excluded. The sample selection was for convenience or non-probabilistic, by addressing general dentists and specialists from Medellín, who were active in the REPS, until completing the calculated sample. A

questionnaire was designed including information on sociodemographic variables, work-related data, knowledge and perception. It was tested in a group of 21 dentists, in order to evaluate internal consistency and the understanding of questions.

This study was endorsed by the Ethics Committee of Universidad CES (Affidavit 154/2016). It complied with the ethical requirements of health research established in the Universal Declaration on Bioethics and Human Rights, the Helsinki Declaration, and the guidelines of Resolution 8430 of 1993, which classifies this study as no-risk research. Confidentiality of the information provided by the population was guaranteed.<sup>10-11</sup>

The univariate analysis that helped characterize the dentists, describe their knowledge on patient safety, and quantify the management of adverse events and the perception of patient safety was performed with distributions of frequencies, measures of central tendency and dispersion measures for the quantitative variables; the qualitative variables were described by percentages. To establish an association between dentists' perception of patient safety in their offices and demographic factors, management of adverse events, and knowledge in patient safety, crude (OR) and adjusted (OR<sub>adj</sub>) prevalence ratios were calculated (OR<sub>aj</sub>) by logistic regression, with their respective 95% confidence interval. Patient's perception of safety (positive or negative) was considered as a dependent variable.

## RESULTS

Of the 215 surveyed dentists, 52% (112) were female and 50% were 41 years or younger at the time of the study. Concerning education level, 55% (118) were general dentists. Of the total number of specialists, 36% (35) were orthodontists. It was found out that 50% of surveyed dentists see 80 patients a month or less. 36% of respondents work in more than one location; of this population, 51% said they have all their locations registered in the REPS.

On the other hand, among dentists who said they had pursued updating courses after graduation, 59% (126) indicated that such training was related to patient safety. With regard to the knowledge of basic terminology of patient safety concepts, it was found that 70% (150) knew the difference between the concepts "adverse event" and "adverse incident"; 24% (51) gave a correct response when asked about the definition of the "security barrier" concept; as for the knowledge of the concept of "insecure

healthcare”, 59% (126) gave an accurate answer, and 80% (171) gave a correct answer when asked about the difference between the concepts “adverse event” and “complication”.

Of the total number of surveyed dentists, 64% (138) answered incorrectly the question related to the knowledge of the five moments of handwashing in dentistry, established by the WHO. In relation to the methodology for the analysis of adverse events, 51% (109) admitted not having an analysis methodology and 29% (63) indicated they use the London Protocol.

In terms of adverse event management, 50% of dentists reported 0 adverse events or incidents over the past year and indicated that they had not had complications during patient care. In relation to the analysis of adverse events and the generation of corrective actions, 50% of the surveyed dentists indicated that they did not do any of these during the last year. 74% indicated a positive perception of patient safety in their offices.

With regard to patient safety perception and sociodemographic characteristics, no statistically significant differences were found per sex,  $p = 0.71$ , according to the Chi square test (Table 1).

**Table 1.** Relation between patient safety perception and the sociodemographic characteristics of independent dentists. Medellín, 2017

|                       |                | Patient Safety Ratings |      |                   |      |       |      | p Value | OR   | CI95% |       |
|-----------------------|----------------|------------------------|------|-------------------|------|-------|------|---------|------|-------|-------|
|                       |                | Positive response      |      | Negative response |      | Total |      |         |      | LI    | LS    |
|                       |                | n                      | %    | n                 | %    | n     | %    |         |      |       |       |
| Sex                   | Female         | 84                     | 52.8 | 28                | 50   | 112   | 52.1 | 0.715   | 1.12 | 0.61  | 2.06  |
|                       | Male           | 75                     | 47.2 | 28                | 50   | 103   | 47.9 | -       | 1.00 | -     | -     |
| Socioeconomic stratum | Low-low        | 1                      | 0.6  | 0                 | 0    | 1     | 0.5  | 0.999   | NA   | NA    | NA    |
|                       | Low            | 5                      | 3.1  | 2                 | 3.6  | 7     | 3.3  | 0.497   | 0.53 | 0.08  | 3.31  |
|                       | Middle         | 22                     | 13.8 | 11                | 19.6 | 33    | 15.3 | 0.123   | 0.42 | 0.14  | 1.26  |
|                       | Middle-High    | 41                     | 25.8 | 15                | 26.8 | 56    | 26   | 0.289   | 0.58 | 0.21  | 1.59  |
|                       | High           | 57                     | 35.8 | 21                | 37.5 | 78    | 36.3 | 0.258   | 0.58 | 0.22  | 1.50  |
|                       | High-High      | 33                     | 20.8 | 7                 | 12.5 | 40    | 18.6 | -       | 1.00 | -     | -     |
| Marital status        | Single         | 49                     | 30.8 | 17                | 30.4 | 66    | 30.7 | 0.973   | 0.96 | 0.09  | 9.87  |
|                       | Married        | 85                     | 53.5 | 31                | 55.4 | 116   | 54   | 0.939   | 0.91 | 0.09  | 9.12  |
|                       | Civil Union    | 11                     | 6.9  | 5                 | 8.9  | 16    | 7.4  | 0.808   | 0.73 | 0.06  | 8.92  |
|                       | Widow/er       | 2                      | 1.3  | 0                 | 0    | 2     | 0.9  | 0.999   | NA   | NA    | NA    |
|                       | Divorced       | 9                      | 5.7  | 2                 | 3.6  | 11    | 5.1  | 0.771   | 1.50 | 0.10  | 23.07 |
|                       | Separate       | 3                      | 1.9  | 1                 | 1.8  | 4     | 1.9  | -       | 1.00 | -     | -     |
| General/Specialist    | General        | 89                     | 56   | 29                | 51.8 | 118   | 54.9 | 0.588   | 1.18 | 0.64  | 2.18  |
|                       | Specialist     | 70                     | 44   | 27                | 48.2 | 97    | 45.1 | -       | 1.00 | -     | -     |
| Specialty             | Orthodontics   | 26                     | 37.1 | 9                 | 33.3 | 35    | 36.1 | -       | 1.00 | -     | -     |
|                       | Endodontics    | 15                     | 21.4 | 5                 | 18.5 | 20    | 20.6 | 0.953   | 1.04 | 0.29  | 3.68  |
|                       | Prosthodontics | 13                     | 18.6 | 4                 | 14.8 | 17    | 17.5 | 0.865   | 1.13 | 0.29  | 4.35  |

|               |                            |    |      |    |      |    |      |       |      |      |       |
|---------------|----------------------------|----|------|----|------|----|------|-------|------|------|-------|
|               | Pediatric dentistry        | 2  | 2.9  | 2  | 7.4  | 4  | 4.1  | 0.322 | 0.35 | 0.04 | 2.83  |
|               | Periodontics               | 4  | 5.7  | 1  | 3.7  | 5  | 5.2  | 0.783 | 1.38 | 0.14 | 14.07 |
|               | Oral Surgery               | 3  | 4.3  | 0  | 0    | 3  | 3.1  | 0.999 | NA   | NA   | NA    |
|               | Pathology                  | 1  | 1.4  | 0  | 0    | 1  | 1    | 0.999 | NA   | NA   | NA    |
|               | Other                      | 6  | 8.6  | 6  | 22.2 | 12 | 12.4 | 0.127 | 0.35 | 0.09 | 1.35  |
| Graduate from | Private school             | 59 | 37.1 | 25 | 44.6 | 84 | 39.1 | -     | 1.00 | -    | -     |
|               | Public school              | 77 | 48.4 | 21 | 37.5 | 98 | 45.6 | 0.199 | 1.55 | 0.79 | 3.04  |
|               | School outside Medellin    | 18 | 11.3 | 10 | 17.9 | 28 | 13   | 0.557 | 0.76 | 0.31 | 1.88  |
|               | School outside the country | 5  | 3.1  | 0  | 0    | 5  | 2.3  | 0.999 | NA   | NA   | NA    |

NA = Not available

In reviewing dentists' knowledge of patient safety policy at each of the locations where they work and comparing it with patient safety perception, statistically significant differences were found,  $p = 0.001$  (Chi squared). Thus, dentists who know the patient safety policies of all the locations are 4.52 more likely to have a positive perception of patient safety, compared to those who do not know the policies. In addition, dentists with full habilitation standards are 7.93 more likely to have a positive perception of patient safety than those who do not; in this sense, a statistically significant difference was found between both,  $p = 0$  (Chi squared) (Table 2).

**Table 2.** Relation between patient safety perception and the working conditions of independent dentists. Medellín, 2017

|                                   |                                   | Patient Safety Ratings |      |                   |      |       |      | p Value | OR   | CI95% |       |
|-----------------------------------|-----------------------------------|------------------------|------|-------------------|------|-------|------|---------|------|-------|-------|
|                                   |                                   | Positive response      |      | Negative response |      | Total |      |         |      | LI    | LS    |
|                                   |                                   | n                      | %    | n                 | %    | N     | %    |         |      |       |       |
| Condition of main location        | Owned                             | 66                     | 41.5 | 25                | 44.6 | 91    | 42.3 | 0.819   | 0.92 | 0.47  | 1.82  |
|                                   | Rented                            | 19                     | 11.9 | 5                 | 8.9  | 24    | 11.2 | 0.612   | 1.33 | 0.44  | 4.01  |
|                                   | Rented/hour                       | 14                     | 8.8  | 5                 | 8.9  | 19    | 8.8  | 0.972   | 0.98 | 0.31  | 3.05  |
|                                   | Percentage                        | 60                     | 37.7 | 21                | 37.5 | 81    | 37.7 | -       | 1    | -     | -     |
| Monthly income (Colombian pesos)  | 1 to 3 million                    | 58                     | 36.5 | 20                | 35.7 | 78    | 36.3 | 0.601   | 1.3  | 0.4   | 4     |
|                                   | 3 to 6 million                    | 57                     | 35.8 | 21                | 37.5 | 78    | 36.3 | 0.685   | 1.3  | 0.4   | 3.7   |
|                                   | 6 to 9 million                    | 31                     | 19.5 | 9                 | 16.1 | 40    | 18.6 | 0.456   | 1.6  | 0.5   | 5.4   |
|                                   | > 9 million                       | 13                     | 8.2  | 6                 | 10.7 | 19    | 8.8  | -       | 1    | -     | -     |
| Registration of all the locations | All                               | 44                     | 55.7 | 11                | 39.3 | 55    | 51.4 | 0.667   | 1.33 | 0.36  | 4.94  |
|                                   | Some                              | 23                     | 29.1 | 13                | 46.4 | 36    | 33.6 | 0.433   | 0.59 | 0.16  | 2.21  |
|                                   | Only the main                     | 12                     | 15.2 | 4                 | 14.3 | 16    | 15   | -       | 1    | -     | -     |
| PS policy in all location         | Yes                               | 61                     | 77.2 | 12                | 42.9 | 73    | 68.2 | 0.001*  | 4.52 | 1.81  | 11.28 |
|                                   | No                                | 18                     | 22.8 | 16                | 57.1 | 34    | 31.8 | -       | 1    | -     | -     |
| Works or worked at an IPS         | Yes                               | 94                     | 59.1 | 32                | 57.1 | 126   | 58.6 | 0.796   | 1.1  | 0.6   | 2     |
|                                   | No                                | 65                     | 40.9 | 24                | 42.9 | 89    | 41.4 | -       | 1    | -     | -     |
| Participation in PS at the IPS    | Participation in the PS Committee | 8                      | 8.5  | 5                 | 15.6 | 13    | 10.3 | 0.313   | 0.5  | 0.2   | 1.8   |
|                                   | EAI Feedback and Learning         | 23                     | 24.5 | 6                 | 18.8 | 29    | 23   | 0.639   | 1.3  | 0.5   | 3.6   |
|                                   | Exclusively attending             | 63                     | 67   | 21                | 65.6 | 84    | 66.7 | -       | 1    | -     | -     |

|                              |     |     |      |    |      |     |      |    |      |      |       |
|------------------------------|-----|-----|------|----|------|-----|------|----|------|------|-------|
| Full accreditation standards | Yes | 147 | 92.5 | 34 | 60.7 | 181 | 84.2 | 0* | 7.93 | 3.58 | 17.57 |
|                              | No  | 12  | 7.5  | 22 | 39.3 | 34  | 15.8 | -  | 1    | -    | -     |

*PS: Patient safety; IPS: Health service provider institution (Institución Prestadora de Servicios de Salud); EIA: Events and adverse incidents*

Dentists who have received post-graduation training in patient safety are 2.4 more likely to have a positive perception of patient safety than those who have not received such training.

Dentists who received undergraduate training in patient safety are 2.1 more likely to have a positive perception of patient safety than those who did not receive such training; a statistically significant difference was found between having received undergraduate training in patient safety and having a positive perception of patient safety during the consultation, with  $p = 0.018$  (Chi squared) (Table 3),

**Table 3.** Independent dentists' education according to patient's safety perception in consultation. Medellín, 2017

|   |                   | Patient Safety Ratings |      |                   |      |       |      | p Value | OR   | IC95% |       |
|---|-------------------|------------------------|------|-------------------|------|-------|------|---------|------|-------|-------|
|   |                   | Positive response      |      | Negative response |      | Total |      |         |      | LI    | LS    |
|   |                   | n                      | %    | n                 | %    | n     | %    |         |      |       |       |
| PS studies during undergraduate program | Yes               | 113                    | 71.1 | 30                | 53.6 | 143   | 66.5 | 0.018 * | 2.1  | 1.1   | 4     |
|   | No                | 46                     | 28.9 | 26                | 46.4 | 72    | 33.5 |         | 1    | -     | -     |
| Post-graduation training                | Yes               | 154                    | 96.9 | 56                | 100  | 210   | 97.7 | 0.179 * | NA   | NA    | NA    |
|   | No                | 5                      | 3.1  | 0                 | 0    | 5     | 2.3  |         | -    | -     | -     |
| Time of most recent update              | 1 year or less    | 124                    | 78   | 42                | 75   | 166   | 77.2 | -       | 1    | -     | -     |
|   | 1 to 2 years      | 20                     | 12.6 | 7                 | 12.5 | 27    | 12.6 | 0.945   | 0.97 | 0.38  | 2.45  |
|   | 2 to 5 years      | 11                     | 6.9  | 6                 | 10.7 | 17    | 7.9  | 0.376   | 0.62 | 0.22  | 1.78  |
|   | More than 5 years | 2                      | 1.3  | 1                 | 1.8  | 3     | 1.4  | 0.753   | 0.68 | 0.06  | 7.66  |
|   | None              | 2                      | 1.3  | 0                 | 0    | 2     | 0.9  | Nd      | Nd   | Nd    | Nd    |
| Some updates are related to PS          | Yes               | 102                    | 64.2 | 24                | 42.9 | 126   | 58.6 | 0.006 * | 2.39 | 1.28  | 4.44  |
|   | No                | 57                     | 35.8 | 32                | 57.1 | 89    | 41.4 |         | -    | 1     | -     |
| Difference between AE and AI            | Yes               | 114                    | 71.7 | 36                | 64.3 | 150   | 69.8 | 0.299   | 1.41 | 0.74  | 2.69  |
|   | No                | 45                     | 28.3 | 20                | 35.7 | 65    | 30.2 |         | -    | 1     | -     |
| Meaning of safety barrier               | Correct answer    | 34                     | 21.4 | 17                | 30.4 | 51    | 23.7 | 0.177   | 0.62 | 0.32  | 1.24  |
|   | Wrong answer      | 125                    | 78.6 | 39                | 69.6 | 164   | 76.3 |         | -    | 1     | -     |
| Meaning of failure in healthcare        | Correct answer    | 96                     | 60.4 | 30                | 53.6 | 126   | 58.6 | 0.374   | 1.32 | 0.71  | 2.44  |
|   | Wrong answer      | 63                     | 39.6 | 26                | 46.4 | 89    | 41.4 |         | -    | 1     | -     |
| Difference between AE and complication  | Correct answer    | 127                    | 79.9 | 44                | 78.6 | 171   | 79.5 | 0.835   | 1.08 | 0.51  | 2.28  |
|   | Wrong answer      | 32                     | 20.1 | 12                | 21.4 | 44    | 20.5 |         | -    | 1     | -     |
| Verification of sterilization           | Correct answer    | 109                    | 68.6 | 38                | 67.9 | 147   | 68.4 | 0.923   | 1.03 | 0.54  | 1.98  |
|   | Wrong answer      | 50                     | 31.4 | 18                | 32.1 | 68    | 31.6 |         | -    | 1     | -     |
| Importance of current regulations       | Little important  | 9                      | 5.7  | 3                 | 5.4  | 12    | 5.6  | 0.482   | 3    | 0.14  | 64.26 |
|   | Important         | 89                     | 56   | 26                | 46.4 | 115   | 53.5 | 0.39    | 3.42 | 0.21  | 56.63 |
|   | Very important    | 60                     | 37.7 | 26                | 46.4 | 86    | 40   | 0.56    | 2.31 | 0.14  | 38.32 |
|   | Is indifferent    | 1                      | 0.6  | 1                 | 1.8  | 2     | 0.9  | -       | 1    | -     | -     |

*PS: Patient safety; AE: Adverse events; AI: Adverse incidents; NA: Not available; \* significant p-value*

Dentists who performed more than one corrective action in the last year are 4.3 more likely to have a positive perception of patient safety than those who did not, with a statistically significant difference,  $p = 0.004$  (Chi squared) (table 4).

Of the dentists who admitted having a bad perception of patient safety, 50% lacked a list of adverse events and incidents. Of those who reported to have good perception, 69.8% had the listing and 30.2% did not have it ( $p = 0.08$ ). This shows that there is association between having listings of adverse events and incidents and the perception of patient safety in the surveyed dentists (Chi squared) (table 4).

**Table 4.** Relation between patient safety perception and the management of adverse events by independent dentists. Medellín, 2017

|                             |                  | Patient Safety Ratings |      |                   |      |       |      | p Value | OR   | CI95% |      |
|-----------------------------|------------------|------------------------|------|-------------------|------|-------|------|---------|------|-------|------|
|                             |                  | Positive response      |      | Negative response |      | Total |      |         |      | LI    | LS   |
|                             |                  | n                      | %    | n                 | %    | n     | %    |         |      |       |      |
| Amount of AEI reported/year | None             | 103                    | 64.8 | 44                | 78.6 | 147   | 68.4 | -       | 1    | -     | -    |
|                             | More than 1      | 56                     | 35.2 | 12                | 21.4 | 68    | 31.6 | 0.059 * | 2    | 1     | 4.1  |
| AEI analyzed/year           | None             | 111                    | 69.8 | 47                | 83.9 | 158   | 73.5 | -       | 1    | -     | -    |
|                             | More than 1      | 48                     | 30.2 | 9                 | 16.1 | 57    | 26.5 | 0.043 * | 2.3  | 1     | 5    |
| Corrective AEI actions/year | None             | 112                    | 70.4 | 51                | 91.1 | 163   | 75.8 | -       | 1    | -     | -    |
|                             | More than 1      | 47                     | 29.6 | 5                 | 8.9  | 52    | 24.2 | 0.004 * | 4.3  | 1.6   | 11.4 |
| Complications/year          | None             | 130                    | 81.8 | 48                | 85.7 | 178   | 82.8 | -       | 1    | -     | -    |
|                             | More than 1      | 29                     | 18.2 | 8                 | 14.3 | 37    | 17.2 | 0.5     | 1.3  | 0.6   | 3.1  |
| Methodology of AEI analysis | London Protocol  | 48                     | 30.2 | 15                | 26.8 | 63    | 29.3 | 0.432   | 1.33 | 0.65  | 2.71 |
|                             | Fishbone diagram | 7                      | 4.4  | 2                 | 3.6  | 9     | 4.2  | 0.651   | 1.45 | 0.29  | 7.38 |
|                             | Whys             | 17                     | 10.7 | 3                 | 5.4  | 20    | 9.3  | 0.195   | 2.35 | 0.65  | 8.6  |
|                             | Other            | 10                     | 6.3  | 4                 | 7.1  | 14    | 6.5  | 0.951   | 1.04 | 0.3   | 3.56 |
|                             | No               | 77                     | 48.4 | 32                | 57.1 | 109   | 50.7 | -       | 1    | -     | -    |
| Has an AE list              | Yes              | 111                    | 69.8 | 28                | 50   | 139   | 64.7 | 0.008 * | 2.31 | 1.24  | 4.32 |
|                             | No               | 48                     | 30.2 | 28                | 50   | 76    | 35.3 | -       | 1    | -     | -    |

AEI: Adverse events and incidents; AE: Adverse events

Finally, an explanatory model was made to identify factors associated with patient safety perception in the consultation of independent dentists in Medellín.

The analysis of the results was performed by adjusting the following variables: patient safety studies during undergraduate studies, post-graduation patient safety updates, availability of full accreditation standards, knowledge of the meaning of the concept “security barrier”, availability of the list of events and adverse incidents, report of events and adverse incidents in the last year, analysis of events and adverse incidents in the last year, and corrective actions of events and adverse incidents over the last year.



The variables that explain the model, that is, the ones that can have a statistically significant association with the dependent variable (patient safety perception) in the presence of the others, would be: pursuing update courses after graduation in relation to patient safety, having full standards of habilitation, and conducting more than one corrective action related to patient safety in the last year. As these variables are independent—these are the ones that best explains the model, according to the Nagelkerke test which establishes the explanatory capacity of the model, being 27.6%. The remaining 72.4% is explained by chance or by variables that were not included in the present study. However, it can be concluded that the other variables are also important factors associated with patient safety (Table 5).

**Table 5.** Factors associated with patient safety perception of independent dentists in the city of Medellín, before and after adjustment. Medellín, 2017

| Variables that entered the model     |                | CRUDE OR |      |       | ADJUSTED OR |      |       |
|--------------------------------------|----------------|----------|------|-------|-------------|------|-------|
|                                      |                | OR       | LI   | LS    | OR          | LI   | LS    |
| Undergraduate PS studies             | Yes            | 2.13     | 1.14 | 3.99  | 1.84        | 0.85 | 4.01  |
|                                      | No             | 1.00     | -    | -     | 1.00        | -    | -     |
| Postgraduate studies related with SP | Yes            | 2.39     | 1.28 | 4.44  | 2.22        | 1.09 | 4.53  |
|                                      | No             | 1.00     | -    | -     | 1.00        | -    | -     |
| Full habilitating standards          | Yes            | 7.93     | 3.58 | 17.57 | 5.13        | 2.09 | 12.55 |
|                                      | No             | 1.00     | -    | -     | 1.00        | -    | -     |
| Meaning of safety barrier            | Correct answer | 0.62     | 0.32 | 1.24  | 0.62        | 0.28 | 1.39  |
|                                      | Right answer   | 1.00     | -    | -     | 1.00        | -    | -     |
| Has AEI listing                      | Yes            | 2.31     | 1.24 | 4.32  | 1.48        | 0.72 | 3.07  |
|                                      | No             | 1.00     | -    | -     | 1.00        | -    | -     |
| Amount of AEI reports/year           | None           | 1.00     | -    | -     | 1.00        | -    | -     |
|                                      | More than 1    | 1.99     | 0.97 | 4.08  | 1.03        | 0.22 | 4.74  |
| analyzed AEI /year                   | None           | 1.00     | -    | -     | 1.00        | -    | -     |
|                                      | More than 1    | 2.26     | 1.03 | 4.97  | 4.12        | 0.53 | 31.86 |
| Corrective AEI actions/year          | No             | 1.00     | -    | -     | 1.00        | -    | -     |
|                                      | More than 1    | 4.28     | 1.61 | 11.40 | 10.04       | 1.73 | 58.41 |

AEI: Adverse events and incidents; AE: Adverse events; PS: Patient safety

## DISCUSSION

While there is some literature and research related to adverse events and patient safety in dentistry, Colombia lacks specific studies on dental professionals who provide their services independently. This is the first study conducted in independent dentists considering demographic aspects, management of adverse events, knowledge and perception of patient safety, so this can be considered an important starting point for the establishment of guidelines to clarify this issue among independent professionals, resulting in direct benefit for patients.

In comparing the dental care conditions in Colombia with those reported by Perea in Spain, it is possible to observe some similarities that could explain the delay or little progress in patient safety in dentistry. The reported conditions are consistent with the situation at the nation level; one of these conditions indicates that adverse events in dentistry are mild in most cases, and the provision of repeated and continuous procedures decreases the possibility of occurrence; however, the inclusion of new technologies and more invasive procedures creates new errors that must be addressed.

On the other hand, there is the dispersal of care centers. Most dental services are offered in private consultation by independent providers, with very little participation of health personnel, unlike hospitals, where the healthcare chain enables the identification and reporting of incidents affecting patients. In addition, since patients usually stay at the dentist's office for a short time, many adverse events occurring after the consultation are identified and cared for by another dentist or emergency service, instead of the dental professional who initially provided the service.<sup>12-14</sup>

Similarly, other studies claim that private dental healthcare relies on positive recognition to be successful, and therefore dentists may associate the identification of errors during the service with a decreased social reputation, instead of perceiving this process as an opportunity for improvement, which in the long term will strengthen the recognition due to a quality service. This is certainly associated with the abovementioned lack of patient safety culture.<sup>12-14</sup>

When comparing the demographic aspects addressed in this study with the results published by Nieto et al in the year 2000, entitled "Demographic and work profile of dentists in the city of Medellín", the following variables are identified: the average age of active dentists in the city of Medellín by the year 2000 was 40 years, with a 7-year difference compared to the average age found in the same population by 2017; both studies report the same percentage of dentists living in the two best socioeconomic strata (62%). In terms of marital status, the same conditions prevail: in both studies, married dentists are predominant, with 60% by the year 2000 and 54% in the present study, followed by single dentists, with equal results in both investigations (31%). Of the population addressed in the first study, 22% were graduates from a private university, while in the current results this figure increased to 51%, which may be due to the fact that a new private university was founded in the city in the last decade. In relation to the findings of the first study, an increase in the population of specialists was observed, going from 25.1 to 45%. In both studies, the group with largest number of specialists is that of orthodontists.

On the other hand, when analyzing aspects related to multiple jobs, it becomes evident that this is an increasing phenomenon in the dental practice. In the results of the year 2000, it was found that 39.3% of participants worked in more than 1 location, while in the present study this figure increased to 50%; however, it should be noted that the average number of patients seen per month did not show the same behavior. In the current study, there is an average of 141 patients per month while the number was approximately 152 in the previous study.<sup>15</sup>

In relation to recruitment styles and the employment situation of dentists, in the study carried out by Moreno in 2009, it is striking that 31.1% of respondents' income was based on a percentage of collections, a situation that is evidently increasing according to the findings in the present study, in which 38% of dentists work for a percentage of collections.<sup>16</sup>

It is important to mention that the regulations requiring independent professionals to include patient safety as part of their clinical practice has been in force in our country for three years, while worldwide this issue has been developing for more than a decade. These three years can be considered a period of transition, and dentists are gradually becoming aware of the knowledge and strategies they require to advance in this sense.<sup>3</sup> As a matter of fact, the present study found out that 80% of respondents have received some type of updating in the last two years, and of these 59% indicate that some of this instruction has been related to patient safety. In addition, it was found that, in general, they know the basic related concepts, showing that the issue is not unfamiliar to them. However, there is much to be improved, especially in strengthening the patient safety culture, by recognizing the failures in service, encouraging the analysis of causes, and proposing the necessary changes to reduce risks in dental care.<sup>17</sup> In Colombia, advances in the identification and reporting of adverse events in other types of health services have been in place since the Health Services Providers (Instituciones Prestadoras de Servicios de Salud, IPS) are required to report to the Ministry of Health and Social Protection. In the specific case of independent professionals, new strategies need to be considered to move forward in this respect.<sup>18</sup>

It is suggested that universities or control and surveillance entities accompany independent dentists more closely in relation to patient safety, as is done in other countries such as Spain and Argentina, where there are safety observatories for dental patients, in charge of educating and stimulating the reporting and analysis of adverse events and incidents, in order to improve the provision of healthcare services through the joint work of health professionals.<sup>19, 20</sup>

Similarly, it can be said that the present study coincides with the one conducted by Castañeda et al, which makes it possible to conclude that adverse events and incidents occur in the provision of dental services but a methodology of analysis has not been fully understood so that we can learn from mistakes and provide patients with better service.<sup>21, 22</sup>

As for the perception of patient safety by dentists in their workplace, the study carried out by Christiani et al shows that 87% (n = 98) of respondents consider it very good to acceptable, and only 6% (n = 7) think it is excellent. This result is higher than the present study, in which 74% of surveyed dentists responded positively to the question related to the perception of patient safety in their workplaces.<sup>23</sup>

With regard to the limitations of the study, it is important to mention that the topic is related to the requirement for independent dentists to comply with current regulations, so many of them refused to participate fearing to be judged or verified by the surveillance and control entities, although the informed consent made it clear that the information was anonymous.

Because this was a transversal study, it was not possible to determine causality; it only established associations between patient safety perceptions and socio-demographic conditions, and the knowledge and management of incidents and adverse events of dentists qualified as independent professionals in the city of Medellín.

## **CONCLUSIONS AND RECOMMENDATIONS**

This study identified that independent dentists generally lack knowledge on the management of adverse events and patient safety practices. The universities and monitoring and control entities should promote theoretical and practical activities to strengthen this knowledge in Colombia, and thus benefit all patients treated by dentists trained as independent professionals.

Surveillance and control bodies are encouraged to promote technical and educational support in patient safety specifically addressed to the general and specialized dental service, in order to implement an effective management system for adverse events and incidents, promoting the patient safety culture in dentistry, focusing on professionals qualified as independent dentists.

Similarly, academic university programs in general and specialized dental schools in particular should be strengthened in terms of greater emphasis on patient safety, in order to promote this culture from the early stages of dental training, seeking to strengthen patient's comprehensive care.

### **CONFLICTS OF INTEREST**

The authors declare that they have no conflict of interest.

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### **CORRESPONDING AUTHOR**

Natalia Calle Henao  
Universidad CES  
(+574) 281 56 77  
[odontologiapyp@gmail.com](mailto:odontologiapyp@gmail.com)  
Calle 56 # 50 – 51  
Itagüí, Colombia

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