

## **Analysis of endodontic dental records of patients who were treated in a public university in south of Brazil**

**Análise de registros odontológicos endodônticos de pacientes tratados em uma universidade pública do sul do Brasil**

**Análisis de expedientes dentales endodónticos de pacientes tratados en una universidad pública del sur de Brasil**

Received: 04/01/2022 | Reviewed: 04/12/2022 | Accept: 04/22/2022 | Published: 04/25/2022

### **Otávio da Silva Sposito**

ORCID: <https://orcid.org/0000-0002-1873-3259>  
Universidade Federal do Rio Grande do Sul, Brasil  
E-mail: [otaviosposito@bol.com.br](mailto:otaviosposito@bol.com.br)

### **Gregório Oliva Tavares**

ORCID: <https://orcid.org/0000-0002-2976-7470>  
Universidade Federal do Rio Grande do Sul, Brasil  
E-mail: [olivatavaresgregorio@gmail.com](mailto:olivatavaresgregorio@gmail.com)

### **Karen Barea de Paula**

ORCID: <https://orcid.org/0000-0002-6779-2765>  
Universidade Federal do Rio Grande do Sul, Brasil  
E-mail: [karenbarea@gmail.com](mailto:karenbarea@gmail.com)

### **Maria Beatriz Cardoso Ferreira**

ORCID: <https://orcid.org/0000-0002-6814-6773>  
Universidade Federal do Rio Grande do Sul, Brasil  
E-mail: [mariabferreira@hcpa.edu.br](mailto:mariabferreira@hcpa.edu.br)

### **Francisco Montagner**

ORCID: <https://orcid.org/0000-0002-7850-0107>  
Universidade Federal do Rio Grande do Sul, Brasil  
E-mail: [francisco.montagner@ufrgs.br](mailto:francisco.montagner@ufrgs.br)

### **Abstract**

Dental record has a fundamental role in dentist performance. This study evaluated the standard registration of dental records of patients submitted to endodontic treatment for undergraduate students (CG) and specialists endodontics students (CE) in a public university in the south of Brazil. The sample was obtained by convenience, consecutively and included dental records patients of a public university in the south of Brazil who were treated at CE and clinical records of patients who were treated at CG, during on the year 2014. Was analyzed the description of endodontic treatment, data retrieved was scored and rated using a modification of the scoring system proposed by Streiner & Norman (1996) and quality of radiographs was performed according to the guidelines of “National Radiological Protection Board”. At dental records were analyzed, 223 belong to CG and 219 belong CE. The records from CE and CG had similar information on the evaluated parameters, except for “presence of rubber dam” and “presence of abbreviature in the description” (Mann-Whitney Test,  $P = 0.386$ ). The absence of periapical radiographs was higher in CE than CG records (CE = 36.77%; CG = 0.46%). (Mann-Whitney test,  $P < 0.0001$ ). There was a predominance of periapical radiographs with the grades “excellent” and “diagnostically acceptable” in both groups. The quality of records generally obtained good results. The incorporation of new science into the educational program like electronic records and digital imaging techniques, facilitating the constant updating of data related to health and treatment of patients improving the record of the evolution of procedures.

**Keywords:** Dental records; Dentistry; Retrospective studies; Medical records; Endodontics.

### **Resumo**

O prontuário odontológico tem papel fundamental na atuação do cirurgião-dentista. Este estudo avaliou o padrão de registro de prontuários odontológicos de pacientes submetidos ao tratamento endodôntico por alunos de graduação (GC) e alunos especialistas em endodontia (CE) em uma universidade pública do sul do Brasil. Amostra foi obtida por conveniência, de forma consecutiva e incluiu prontuários odontológicos de pacientes atendidos por CE e prontuários de pacientes atendidos por GC, durante o ano de 2014. Foi analisada a descrição do tratamento endodôntico, os dados recuperados foram pontuados e avaliados usando uma modificação do sistema de pontuação proposto por Streiner & Norman (1996) e a qualidade das radiografias foi analisada de acordo com as diretrizes do “National Radiological

Protection Board”. Nos prontuários odontológicos foram analisados, 223 pertencentes ao GC e 219 pertencentes ao CE. Os prontuários do CE e do CG apresentaram informações semelhantes sobre os parâmetros avaliados, exceto para “presença de isolamento absoluto” e “presença de abreviaturas na descrição” (Teste de Mann-Whitney,  $P = 0,386$ ). A ausência de radiografias periapicais foi maior em CE do que os registros do CG (CE = 36,77%; CG = 0,46%) (Teste de Mann-Whitney,  $P < 0,0001$ ). Houve predomínio de radiografias periapicais com notas “excelente” e “diagnóstico aceitável” em ambos os grupos. A qualidade dos registros obteve bons resultados. Conclui-se que a incorporação de novas ciências ao programa educacional como prontuários eletrônicos e técnicas de imagem digital, facilita a atualização constante dos dados relacionados à saúde e tratamento dos pacientes, melhorando o registro da evolução dos procedimentos.

**Palavras-chave:** Registros odontológicos; Odontologia; Estudos retrospectivos; Registros médicos; Endodontia.

### Resumen

El registro dental juega un papel fundamental en el desempeño del odontólogo. Este estudio evaluó el patrón de registro de registros dentales de pacientes sometidos a tratamiento de endodoncia por estudiantes de pregrado (GC) y estudiantes especialistas en endodoncia (EC) en una universidad pública en el sur de Brasil. La muestra se obtuvo por conveniencia, de forma consecutiva, e incluyó registros dentales de pacientes tratados por CE y registros médicos de pacientes tratados por GC durante 2014. La descripción del tratamiento endodóntico, los datos recuperados fueron puntuados y evaluados utilizando una modificación del sistema de puntuación propuesto por Streiner & Norman (1996) y se analizó la calidad de las radiografías de acuerdo con las directrices de la National Radiological Protection Board. En los registros dentales se analizaron 223 pertenecientes al GC y 219 pertenecientes a la CE. Las historias clínicas de la CE y CG presentaron información similar sobre los parámetros evaluados, excepto por “presencia de aislamiento absoluto” y “presencia de abreviaturas en la descripción” (prueba de Mann-Whitney,  $p = 0,386$ ). La ausencia de radiografías periapicales fue mayor en los registros de EC que en los de GC (EC = 36,77%; GC = 0,46%) (prueba de Mann-Whitney,  $P < 0,0001$ ). Hubo un predominio de radiografías periapicales con puntajes de “excelente” y “diagnóstico aceptable” en ambos grupos. La calidad de los registros en general tuvo buenos resultados. Se concluye que la incorporación de nuevas ciencias al programa educativo, como la historia clínica electrónica y las técnicas de imagen digital, facilita la actualización constante de los datos relacionados con la salud y el tratamiento de los pacientes, mejorando el registro de la evolución de los procedimientos.

**Palabras clave:** Registros odontológicos; Odontologia; Estudios retrospectivos; Registros médicos; Endodoncia.

## 1. Introduction

The appropriate register of information related to the patient is crucial for health action. It comprises a series of documents related to the history of present and previous diseases, clinical diagnostics, performed treatments, prognosis, administrative, financial, quality assurance, forensic, medico-legal issues, among other (Charangowda, 2010).

Dental schools play an essential role in developing the record-keeping skills of future practitioners. Academic assessment measures must be implemented to ensure that the students achieved dental record keeping competencies. Students are often supervised by several clinical instructors when treating an individual patient, especially if the treatment extends over several visits. Sometimes changes the initial treatment plan is made, this can cause confusion and inability to give an adequate and concise case history (Pessian & Beckett, 2004).

The clinical record is essential for an analysis of the assistance that is offered to patients. Several health services use electronic means to carry out these records (Soares et al., 2020). Clinical record keeping is a part of continuing professional development and in some contexts is a mandatory requirement for specialist training and registration (Chong et al., 2014).

This study evaluated the standard registration of dental records of patients submitted to endodontic treatment for undergraduate students (CG) and specialists endodontics students (CE) in a public university in the south of Brazil.

## 2. Methodology

This cross-sectional retrospective study was approved revised by the Institutional Research Board and also by the Ethics Committee in Research from the Universidade Federal do Rio Grande do Sul (CAAE number 44529315.7.0000.5347). It followed the national ethics resolutions for research in humans (Resolution 466/2012 and 510/2016, Conselho Nacional de Saúde, Ministério da Saúde).

The population of the study comprised the total number of records from patients that had endodontic treatment at the specialization course in endodontics (CE) and the undegraduation clinics (CG), from March to December of 2014. The parameters for sample size calculation were: the prevalence treatment performed in registration records obtained in the study of as reported by Dosumu et al. (2012), equal to 20.4%; and, significance level = 5%. The sample size was set at 219 records to CE and 223 records to the CG, as obtained through the software WINPEPI v11.63 (Novoa & Novoa, 2014). In order to allow for comparison, an equal number of dental records were assessed for CG (n=223) and CE (n=219). The inclusion criteria were: files from patients older than 18 years-old that had at least one root canal treatment.

The variables of interest associated with the description of the endodontic treatment were: (Q1) the tooth that is receiving endodontic treatment; (Q2) the registration of coronal access, removal of coronal sealing, or other equivalent procedure; (Q3) the use of rubber dam; (Q4) the indication of the root canals orifices in the pulp chamber, root canal length determination, removal of the dressing, chemomechanical preparation or other equivalent procedure for root canal preparation; (Q5) placement of intracanal dressing or root canal filling; (Q6) coronal sealing; (Q7) information with readable letter; (Q8) date of the appointment; (Q9) presence of abbreviations in the description of the procedure; (Q10) signature presence of student, patient or teacher. All the items were scored as "zero" for "absence" and "1" for the "presence" of the information.

The retrieved data was scored and rated using a modification of the scoring system suggested by Streiner et al. (1996). The final score results from:  $[(Q1 + Q2 + Q3 + Q4 + Q5 + Q6) * 0.83] + [(Q7 + Q8 + Q9) * 1] + [Q10 * 2]$ . The scores were categorized as follow: a) insufficient (< 6 points) – the professional who accesses the dental records is unable to properly assess how and what was done during the endodontic treatment; b) regular ( from 6 to < 8 points) – the professional that accesses the dental records can properly evaluate some stages of endodontic treatment, and can continue it, but did not have complete information, which may result in poor security; c) good ( $\geq 8$ ) – the professional that accesses the dental records can evaluate adequately all phases of endodontic treatment, so that it can continue it safely.

The analysis of the quality of radiographs was performed according to the guidelines of “*National Radiological Protection Board*” (Board 2001; Health 2001) (Table 1).

The statistical analysis was carried out (PRISM, GraphPad Software, San Diego, CA). The significance level was set al 5%. The Mann-Whitney test was employed to compare the information of the procedures description and the radiographic characteristics between the CG and CE files.

**Table 1.** Subjective quality rating of radiographs.

Rating	Quality	Basis
1	Excellent	No errors of patient preparation, exposure, positioning, processing or film handling.
2	Diagnostically acceptable	Some errors of patient preparation, exposure, positioning, processing or film handling, but which do not detract from the diagnostic utility of the radiograph.
3	Unacceptable	Errors of patient preparation, exposure, positioning, processing, or film handling, which render the radiograph diagnostically unacceptable.

Source: Authors

### 3. Results

The records from CE and CG had similar information on the evaluated parameters, except for “presence of rubber dam” and “presence of abbreviature in the description”, as indicated in Table 2. Both CG and CE had a predominance of “good” as the category within the presence of the information related to the description of the endodontic procedures.

However, CE was superior to CG regarding this parameter (Mann-Whitney Test,  $P = 0.386$ ) (Figure 1). The absence of periapical radiographs was higher in CG than CE records (CG = 36.77%; CE = 0.46%) (Mann-Whitney test,  $P < 0.0001$ ).

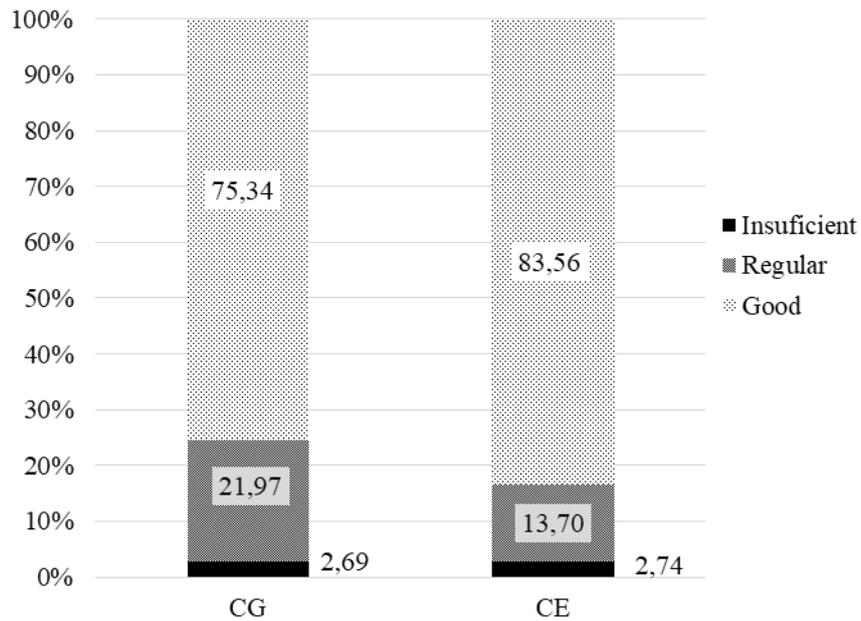
There was a predominance of periapical radiographs with the grades “excellent” and “diagnostically acceptable” in both groups. However, the subjective quality rating of radiographs was higher for CG than for CE (Mann-Whitney test,  $P < 0.0001$ ) (Figure 2).

**Table 2.** Percentual values for positive response to each question for CG and CE.

Questions	CG (n=223)	CE (n=219)	P
Tooth number (Q1)	85.2%	89.5%	0.1753
Access to pulp chamber (Q2)	80.3%	85.4%	0.1545
Presence of rubber dam (Q3)	71.7%	88.1%	<0.001
Root canal length determination/preparation (Q4)	98.7%	99.1%	0.6694
Intracanal dressing/root canal filling (Q5)	93.7%	97.3%	0.0740
Provisional restoration (Q6)	96.9%	96.8%	0.9736
Legible handwriting (Q7)	99.6%	99.1%	0.5540
Date of the procedure (Q8)	100%	100%	0.9999
Presence of abbreviation in the description (Q9)	8.97%	0.46%	<0.0001
Signature (student, patient, instructor) (Q10)	89.7%	90%	0.9264

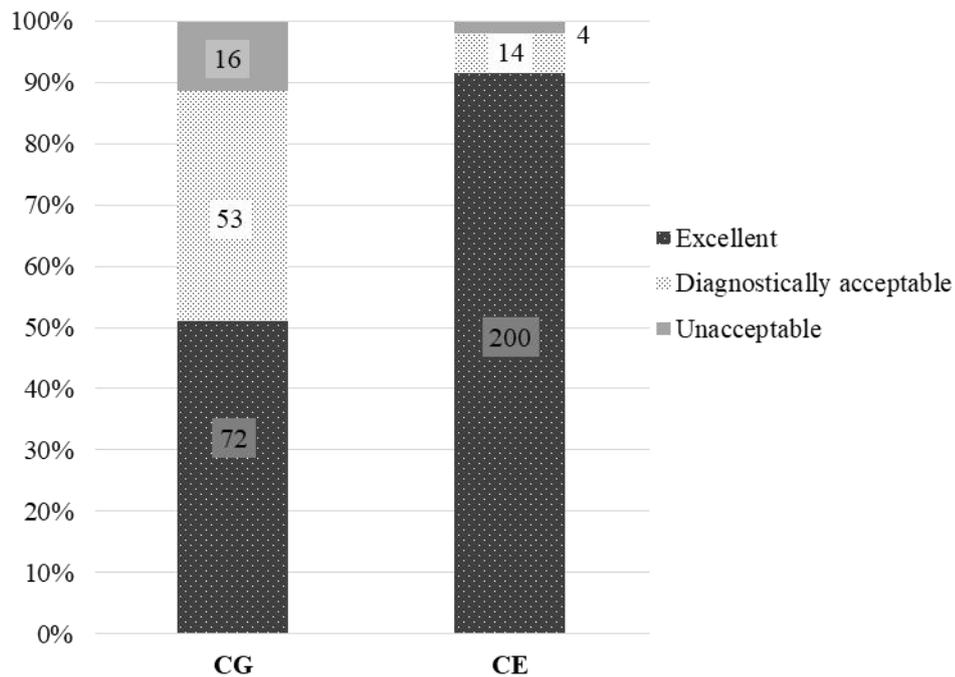
Source: Authors

**Figure 1.** Relative frequency of the categories for the description of the endodontic treatment within the dental records (Mann-Whitney Test,  $P=0.0386$ ).



Source: Authors.

**Figure 2.** Relative frequency of the categories for the subjective quality rating of radiographs within the dental records (Mann-Whitney Test,  $P < 0.0001$ ).



Source: Authors.

#### 4. Discussion

Record keeping in dental practice is a primary responsibility of the dentist, serving the overall goal of protecting both the patient and the dentist. Poor dental records expose the patient and clinician to a myriad of risks, including inappropriate, inefficient, or illegal practices. Dental schools have a vital role in averting these risks and in terms of future practitioner behavior (Rios Santos et al., 2008).

The scoring system employed in the present study evaluated the quality of the recording information for the endodontic treatment at the end of each clinical session. The results demonstrated that the CG and CE students correctly detailed the procedures that they had performed. It was observed that the date of the procedure execution has always been present in the dental records. All the items from the questionnaire had a high degree of registration, allowing for understanding the procedural sequence of the endodontic treatment. The records from CE and CG had similar information on the evaluated parameters, except for "the presence of rubber dam" and "the presence of abbreviations in the description" (Table 2). The placement of the rubber is mandatory in the endodontic treatment. The actual frequency of rubber dam use by students is higher than reported. The absence of information in medical records can be explained by the attention that students/professionals give to specific steps of the treatment in detriment to the others (Pourasghar et al., 2008). It might seem obvious that a root canal treatment was conducted under rubber dam isolation.

A study realized in India showed that when an audit of the records was done, it is common to detect mistakes in recording patient history by the students. The accurate registration of the patient information allows for improving the quality of care. Clinical audit including education can favorably change treatment rendered by dental practitioners (Motimath et al., 2017).

For a clinical record to be considered legally adequate, it must present all standardized documentation for recording information relevant to the service user, from the beginning to the end of the treatment. Incomplete records can make it

difficult to understand the reason that led to the procedure performed or the follow-up of cases, and this has legal value (Zimmer et al., 2021).

Dierickx et al. (2006) indicated that the dental records filled by younger dentists are more complete than the ones from older dentists. This fact could be related to the use of digital dental records in which information is automatically registered. A study in the United Kingdom assessed the dental charts of 1128 patients and observed that 44% of the dental charts were found to hold inaccurate information (Amos et al., 2015). Therefore, as the dental recording is an integral part of daily clinical practice, all dental schools should likely teach record-keeping skills (Brown & Jephcote, 2017).

The initial radiograph is mandatory before starting an endodontic treatment. However, they can be lost during the dental records transportation from the central archives to the clinics. In the CG, the initial radiograph was present only in 141 dental records. Some studies in other Brazilian centers showed that inadequate archival eventually causes loss of radiographic documents (Lima et al., 2010). On the other hand, the CE radiographs were present in 218 records. A factor that might contribute to the higher number of initial radiographs in CE than CG is that they are stored in a specific archive, with the most limited access than for CG.

Contemporary approaches have been introduced toward patient management/record systems, data mining/management applications, and simulation/computer-assisted learning environments (Iacopino, 2007).

A study conducted by Stok Capella et al. (2019) described the development and implementation of a dental record within electronic databases in the public primary health care system in Buenos Aires. Dental record within electronic databases has advantages such as quick access to the patient's history, availability to remove information, sharing of information between health professionals, continuous and updated data process, reduction of service time, prevention of diagnostic errors and improvement in the quality of care (Neves et al., 2020).

Most dental schools have already implemented some type of electronic paperless records, digital imaging techniques, and patient management systems. Additionally, these technologies can improve patient care through fast and efficient management of large amounts of clinical information. Institutional efforts might be directed to implement the use of digital records in the institution, attempting to the safe management of the information.

## 5. Conclusion

The quality of records keeping among CG and CE was similar and reached a good standard. Record-keeping function extends beyond continuity of care to forensic investigations, auditing, communication with colleagues, research, and consideration of medico-legal complaints. The incorporation of electronic record systems and digital imaging techniques will facilitate the constant updating of data related to the health and treatment of patients improving the record of the evolution of procedures. The quality of dental records will be a predictor of future practice behavior.

## References

- Amos, K. J., Bearman, M., & Palermo, C. (2015). Evidence regarding teaching and assessment of record-keeping skills in training of dental students. *Journal of dental education*, 79(10), 1222-1229. <https://doi.org/10.1002/j.0022-0337.2015.79.10.tb06016.x>
- Brown, N. L., Jephcote, V. E., Morrison, J. N., & Sutton, J. E. (2017). Inaccurate dental charting in an audit of 1128 general dental practice records. *Dental update*, 44(3), 254-260. <https://doi.org/10.12968/denu.2017.44.3.254>
- Charangowda, B. K. (2010). Dental records: An overview. *Journal of forensic dental sciences*, 2(1), 5. <https://dx.doi.org/10.4103%2F0974-2948.71050>
- Chong, J. A., Chew, J. K., Ravindranath, S., & Pau, A. (2014). Clinical Audit Teaching in Record-Keeping for Dental Undergraduates at International Medical University, Kuala Lumpur, Malaysia. *Journal of dental education*, 78(2), 206-212. <https://doi.org/10.1002/j.0022-0337.2014.78.2.tb05671.x>
- Department of Health. (2001). Guidance Notes for Dental Practitioners on the Safe Use of X-Ray Equipment. <https://www.rqia.org.uk/RQIA/files/44/449bdd1c-ccb0-4322-b0df-616a0de88fe4.pdf>

- Dierickx, A., Seyler, M., De Valck, E., Wijffels, J., & Willems, G. (2006). Dental records: a Belgium study. *Journal of Forensic Odontostomatology*, 24(1), 22. <http://www.iofos.eu/Journals/JFOS%20Jun06/dierckyx.june06.pdf>
- Dosumu, E. B., Dosumu, O. O., & Lawal, F. B. (2012). Quality of records keeping by undergraduate dental students in Ibadan, Nigeria. *Annals of Ibadan postgraduate medicine*, 10(1), 13-17. <https://www.ncbi.nlm.nih.gov/pubmed/25161401>
- Iacopino, A. M. (2007). The influence of "new science" on dental education: current concepts, trends, and models for the future. *Journal of Dental Education*, 71(4), 450-462. <https://doi.org/10.1002/j.0022-0337.2007.71.4.tb04296.x>
- Lima, L. R., Lima Júnior, G. T. D. A., Machado Filho, J. A., & Freitas, S. A. P. (2010). Assessment of quality and periapical radiographs' archiving in the clinic of endodontics, Faculty NOVAFAP. *Odontologia Clínico-Científica (Online)*, 9(4), 355-358. <http://revodonto.bvsalud.org/pdf/occ/v9n4/a16v9n4.pdf>
- Motimath A, Baliga SD, Sharma S. (2017) Clinical audit and record keeping guide for improving patient care. *J. Evid. Based Med. Healthc.* 4(32), 1929-1931. <http://dx.doi.org/10.18410/jebmh/2017/377>
- National Radiological Protection Board. (2001). Guidance notes for dental practitioners on the safe use of X-ray equipment. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/926294/misc\\_pub\\_DentalGuidanceNotes.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/926294/misc_pub_DentalGuidanceNotes.pdf)
- Neves, K. do C., Fassarella, B. P. A., Ribeiro, W. A., Faillace, G. B. D., Fassarella, M. B., Silva, A. C. S. da, Silva, F. J. D., Felício, F. de C., Oliveira, K. G. de M. de, Oliveira, S. L. de, Silva, A. S., & Farias, B. S. (2020). Benefits and disadvantages of implementing the electronic patient record for the health service. *Research, Society and Development*, 9(7), e735974630. <https://doi.org/10.33448/rsd-v9i11.10201>
- Novoa, P. C. R. (2014). O que muda na ética em pesquisa no Brasil: Resolução 466/12 do Conselho Nacional de Saúde. *Einstein (São Paulo)*, 12(1), vii-vix. <https://doi.org/10.1590/S1679-45082014ED3077>
- Pessian, F., & Beckett, H. A. (2004). Record keeping by undergraduate dental students: A clinical audit. *British dental journal*, 197(11), 703-705. <https://doi.org/10.1038/sj.bdj.4811866>
- Pourasghar, F., Malekafzali, H., Kazemi, A., Ellenius, J., & Fors, U. (2008). What they fill in today, may not be useful tomorrow: Lessons learned from studying Medical Records at the Women hospital in Tabriz, Iran. *BMC public Health*, 8(1), 1-7. <https://doi.org/10.1186/1471-2458-8-139>
- Rios Santos, J. V., García, M., Segura-Egea, J. J., Fernández Palacín, A., & Bullon, P. (2008). Audit of dental reports (II): First Phase-II study in a Spanish Faculty of Dentistry. <http://hdl.handle.net/10550/61092>
- Soares, C. de F., Viana, V. M. O., Viana, V. A. O., Silva, M. J. da, Silva, V. R. da, Pacheco, E. S., Santos, M. A. R. dos, Silva, D. H. da, Marques, J. S., & Gomes, A. T. (2020). The importance of nursing records for health care from the perspective of nurse auditors. *Research, Society and Development*, 9(7), e309974007. <https://doi.org/10.33448/rsd-v9i7.4007>
- Stok Capella, J. F., Zubillaga, M. J., Nero, F. G., Muguierza, P., Lanuza, J., Alassia, L., ... & Baum, A. (2019). Design, Implementation and Adoption of an Electronic Dental Record Within an Electronic Health Record in the Public Healthcare System of Buenos Aires City. <https://doi.org/10.3233/SHTI190656>
- Streiner, D. L., Norman, G. R., & Cairney, J. (2015). *Health measurement scales: a practical guide to their development and use*. Oxford University Press, USA. <https://doi.org/10.1093/med/9780199685219.001.0001>
- Zimmer, K., Ribeiro, Y. S., Kozłowski Junior, V. A., Roderjan, D. A., Silva Junior, M. F., & Silveira, C. M. M. (2021). Sociodemographic and clinical profile of users treated in the Endodontics discipline of the Ponta Grossa State University between 2010-2017. *Research, Society and Development*, 10(8), e44310817386. <https://doi.org/10.33448/rsd-v10i8.17386>