



ORIGINAL ARTICLES

Computerization of medical records in dental clinics

Informatización de registros médicos en clínicas estomatológicas

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ABSTRACT

Introduction: new information and communications technologies have impacted all areas of human life, with special emphasis on the public health sector. The computerization process of health system is comprehensive in its conception and projection.

Objective: to implement a computer application for the management of information from the medical records processes in the area of admission of Pedro Borrás Astorga Community Teaching Polyclinic and Antonio Briones Montoto Dentistry Care Clinic.

Methods: the research complied with a technological- development research which was aimed at developing the prototype of a computer application for the management of the medical record processes using information and communication technologies, from the study of the



current needs and shortcomings of this service. The target group of the study was constituted by the Dentistry Clinics of the country and the chosen sample belongs to the pilot institutions: Pedro Borrás Astorga Community Teaching Polyclinic and Antonio Briones Montoto Dentistry Care Clinic, both from Pinar del Río municipality.

Results: one of the challenges of this research is to implement a system for dentistry health-care centers through the analysis, design and development of a user-friendly computer application that will help health personnel to improve the processes of patient registration, shift schedule, agenda service and archive, being this an implemented computer tool on a web platform that provides a problem-solving tool in the entity.

Conclusions: the process of computerization of the health sector is aimed at the patient and guarantees the quality, suitability and consistency of information, which will result in a continuous and sustained increase in the quality of medical care, in order to achieve results and for decision making.

MeSH: SOFTWARE; MEDICAL RECORDS; DENTAL CLINICS; FILING; INFORMATION SERVICES.

RESUMEN

Introducción: las nuevas tecnologías de la Informática y las comunicaciones han impactado en todas las áreas de la vida del ser humano y con especial énfasis en el sector de salud pública. El proceso de informatización de salud es abarcador en su concepción y en su proyección.

Objetivo: implementar una aplicación informática para la gestión de la información de los procesos de registros médicos en el área de admisión de las clínicas estomatológicas Policlínico Universitario "Pedro Borrás Astorga" y Clínica Estomatológica Docente "Antonio Briones Montoto

Métodos: la investigación obedece a un estudio de investigación-desarrollo tecnológico que tiene como objetivo desarrollar el prototipo de una aplicación informática para la gestión de los procesos de registros médicos empleando las tecnologías de la información y las comunicaciones.

Resultados: uno de los retos de esta investigación es implementar un sistema para los centros de salud de estomatología mediante el análisis, diseño y elaboración, de una aplicación informática agradable al usuario, que ayudará al personal de salud a mejorar los procesos de inscripción del paciente, agenda de turnos, agenda servicio y archivo, siendo esta una herramienta informática implementada sobre plataforma web que da solución al problema a resolver en la entidad.

Conclusiones: este proceso de informatización del sector lo constituye el paciente y se garantiza la calidad, oportunidad y consistencia de la información, que redundará en un incremento continuo y sostenido de la calidad en la atención médica, así como aporta resultados y apoyo a la toma de decisiones.

DeCS: SOFTWARE; REGISTROS MÉDICOS; CLÍNICAS ODONTOLÓGICAS; ARCHIVO; SERVICIOS DE INFORMACIÓN.

INTRODUCTION

Computing offers solutions to the companies that facilitate the handling of large amounts of information with which they work on a daily basis.

Computer applications in the health sector, is aimed at ensuring, from the public health system, comprehensive health care and quality service to people. The great advances lead to the growing need for systems that manage large volumes of data, highlighting their simplicity of use, rapid access to information, the preparation of documents and the creation of new reports thanks to the interrelation of the different fields.

In dental clinics, the applications implemented benefit the client, since they save physical space for the storage of patient records and the amount of time spent searching for the required information provides security and reliability of stored data and the organization in the management of appointments. The computerization of the clinical history (CH) has become in recent years, the target of most of the work of Medical Informatics.

Studies related to on the usefulness of electronic medical records (computerized medical records) have been published in the United States and Europe, with favorable results in effectiveness values and degree of agreement with these computer systems, although many of these studies were conducted by companies marketing electronic systems for the medical record, data that could bias some way the results, having valid epidemiological analysis. On the other hand, there are studies, especially in the old continent, that are not linked to the commercialization of products. ⁽¹⁾

In Peru, in Peru Health Center of the 3rd zone, in the district of San Martín de Porres, Lima, in 2014, an electronic medical records system was implemented due to the insufficient management of medical records carried out by the Admission Area, developed with free technologies (MySQL, Apache Tomcat, J2EE, Eclipse and/or Net Beans) and easy to be maintained. This system can be implemented in any health center, medical center, private practices, as the software adapts to their reality, patient care and technological resources available.⁽²⁾

Also in Ecuador, in 2015, ⁽³⁾ a computer system based on the single dental health history (SDHH) was developed for the application and assessment in private practices.

In Cuba, the level of computerization of society has increased; in the public health sector, steps have been taken in the computerization of health education and the construction of a telecommunications infrastructure. ⁽⁴⁾

An example of a system related to our country is the Hospital Information System (HIS), SIH GalenClínica of the company Softel, which facilitates the management of the pharmacy, laboratories and hospital movement, areas such as Admission, Archive, Information and Hospital Statistics have been computerized. ^(5, 6)

The substitution of traditional CH, on paper, by a computerized medical record (CMR), responds to several needs:

- 1- To solve the two classic problems of the CH archives, the continuous growth of the stored volume, this creates serious problems of physical space, and the inevitable transfer of original documents, with the risk of loss and deterioration.
- 2- Allowing the rapid transfer of existing health information from a patient to distant points, with the unification of the CH beyond the limits of the institutions of health care.
- 3- This information is accessible to the researchers and health planners in an affordable and uncomplicated way.

Therefore, the general objective of this research is to implement a computer application for the management of information from the medical records processes in the area of admission at Pedro Borrás Astorga Community Teaching Polyclinic and Antonio Briones Montoto Dentistry



Care Clinic. It is specifically proposed to investigate and model the information management process of the admission area belonging to Pedro Borrás Astorga Community Teaching Polyclinic and Antonio Briones Montoto Dentistry Care Clinic. In addition, to design a database that stores the related information of the admission area and to develop a computer application that will implement the information management model that is generated in the admission area at Pedro Borrás Astorga Community Teaching Polyclinic and Antonio Briones Montoto Dentistry Care Clinic in Pinar del Río.

METHODS

The research obeys to a study of technological research-development that has as main objective to develop the prototype of a computer application for the management of the processes of medical records, with the use of the technologies of information and communications, starting from the study of the necessities and the current deficiencies of this service. The target group of the study is constituted by the dentistry clinics of the country and the selected sample belongs to the pilot institutions: Pedro Borrás Astorga Community Teaching Polyclinic and Antonio Briones Montoto Dentistry Care Clinic, both from Pinar del Río municipality. Theoretical methods are used: analysis and synthesis, inductive-deductive and interview.

RESULTS

With the implementation on the web platform of a system for dentistry health centers through the analysis, design and development of a user-friendly computer application, the processes of patient registration, shift schedule, service agenda and archive will be optimized. ^(7, 8)

The application is developed with free software and complies with the country's strategy on the use of this type of software license, which facilitates the deployment of the system.

System Requirements

The study of the client's expectations and needs, through frequent interviews, has made it possible to identify the Functional Requirements (the conditions or capacities that the system must meet) to which the system must respond.^(9,10)

The Functional Requirements raised for the development of the application are:

- Authenticate the user.

- To manage the data for the setting of the system:
 1. Introduce the data for the setting of the system
 2. Modify the data for the setting of the system
 3. Delete data for the setting of the system

- To manage the preparation of the service agenda.
 1. Insert service agenda
 2. Modify service agenda
 3. Delete service agenda

- Manage the shift schedule.

1. Insert shifts
2. Change shifts
3. Delete shifts

- Manage the registry of patients.

1. Inserting the patient registration
2. Modify patient registry
3. Delete patient registration

Manage the patient's medical history in the records.

1. Search for the patient's medical history in the records.
2. Delete the patient's medical history in the folder

Non-Functional Requirements

Non-Functional Requirements are properties or attributes that the product must have and can cover all functions (the operating system platform) or be specific to a function or group of functions. The application to be developed must comply with the following Non-Functional Requirements:

Escalation: the computerized system of medical records of dentistry clinics must allow the incorporation of new modules that make it possible to increase its all functions.

Appearance or external interface: it is a very legible and simple system to be used for the users who interact with it, which allows the use of it without previous training.

Requirements of use: the application is accessible to people without computer experience.

Performance: speedy processing and response time.

Support Requirements: to guarantee the setting-up and installation of the software to ensure the requirements to be met. Tests will be carried out to guarantee the quality of the product.

Database Model

The design of the Database is a very important activity within the software development cycle, this includes three general stages: conceptual, logical and physical. For the design it is necessary the understanding of a model. (Fig. 1)

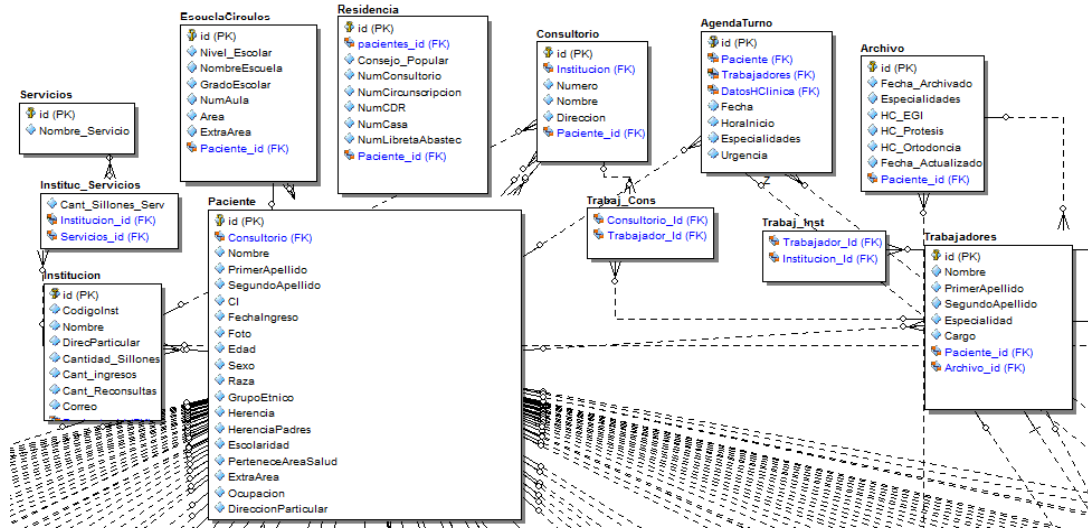


Fig 1- Design of a database

Main interfaces of the application

This interface manages all information regarding identity card, name and surname, address, area or extra area, gender, skin color, date of birth, age and doctor's office. (Fig. 2)

The screenshot shows a web browser window with the following details:

- Page Title: Clínica Estomatológica
- URL: localhost:4200/pacientes/crear
- Navigation: Inicio, Pacientes
- Breadcrumbs: Admisión > Pacientes > Crear
- Form Title: Datos del Paciente
- Fields:
 - CI:
 - Nombre:
 - Apellidos:
 - Dirección:
 - Area:
 - Extrareaa:
 - Sexo:
 - Color de Piel:
 - fechanacimiento:
 - edad:
 - consultorio:
- Button: + Crear Paciente

Fig. 2 Patient registration

List of all patients attending the clinic with their respective data inserted in admission. (Fig. 3)










CI	Nombre	Apellidos	Sexo	Edad	Consultorio	Acciones
661005104	Ara	Rodriguez Sanches	Femenino	49	34	  
93020500192	Raschel	Ramirez Martinez	Femenino	24	25	  
84122400235	Maciel	Ramirez Martinez	Femenino	27	25	  

Fig. 3 List of all patients

CONCLUSIONS

The information management process of the admission area in the Dentistry Care Department of Pedro Borrás Astorga Community Teaching Polyclinic and Antonio Briones Montoto Dentistry Care Clinic in Pinar del Río was investigated. The management process of the information generated in the admission area in these dentistry clinics was modeled. The design of a database to store information related to the admission area in dental clinics and a computer application was developed to put into practice the information management model generated in the admission area in the chosen dental care centers in Pinar del Río.

Conflict of interest

The authors state that there is no conflict of interest.

Authors' contribution

The authors contributed equally to the design of the study.

BIBLIOGRAPHIC REFERENCES

1. Alonso Lanza JL. La historia clínica electrónica: ideas, experiencias y reflexiones. Acimed 2005[citado 04/11/2017];13(5). Disponible en: http://bvs.sld.cu/revistas/aci/vol13_5_05/aci02505.htm
2. Gutarra Mejía A CR, Quiroga Rosas RC. Implementación de un sistema de historias clínicas electrónicas para el centro de salud Lima-Perú 3ra zona [Tesis]. Escuela profesional de ingeniería de computación y sistemas escuela profesional de ingeniería de computación y sistemas; 2014 [citado 04/11/2017]: [aprox. 198p.]. Disponible en: https://www.repositorioacademico.usmp.edu.pe/bitstream/usmp/1463/3/gutarra_mcr_comp_leta.pdf
3. Quezada Ramírez VG. Plan de equipamiento y diseño de una clínica dental. [Tesis en Internet]. Ecuador: Universidad de Guayaquil. Facultad Piloto de Odontología; © 2014 [citado 18/09/2015]. [Aprox. 45 p.]. Disponible en: <http://repositorio.ug.edu.ec/bitstream/redug/3269/1/655%20Marcos%20Eduardo%20Andrade%20Pacheco.pdf>

4. Rodríguez Díaz A, García González G, Barthelemy Aguiar K. Informatización en el Sistema Nacional de Salud. Enfoques hacia la dirección en salud. Revista INFODIR [Internet]. 2013 [citado 28/11/2017]; 1(16): [aprox. 1 p.]. Disponible en: <http://www.revinfodir.sld.cu/index.php/infodir/article/view/8>
5. Vazquez EN, Komar D, Martinez S, Oliveira Ribas LF, Rocha Lyra M. Implementación de una Historia Clínica Electrónica en un plan de salud a nivel nacional en Brasil. [Internet]. 2003 [Citado 28/11/2017]: [aprox. 10 p.]. Disponible en: https://www.researchgate.net/publication/229055766_Implementacion_de_una_Historia_Clinica_Electronica_en_un_plan_de_salud_a_nivel_nacional_en_Brasil
6. República de Cuba. Ministerio de salud pública. Área de asistencia médica y social. Dirección nacional de estomatología. Manual de acreditación de los servicios estomatológicos de cuba. [internet]. 2002 [Citado 28/11/2017]: [aprox. 2 p.]. Disponible en: <http://files.sld.cu/sida/files/2012/01/manual-acredit-serv-estomatol.pdf>
7. Vallejo Sánchez JM, Rodríguez Palma M. Aplicaciones informáticas en la gestión asistencial de una residencia de mayores. Gerokomos [Internet]. 2009 Jun [citado 26/04/2019]; 20(2): [aprox. 6p.]. Disponible en: http://scielo.isciii.es/scielo.php?script=sci_arttext&pid=S1134-928X2009000200002&lng=es
8. Manual de enfermería Médico-Quirúrgica V y VI. Parte 2. La Habana: Editorial Pueblo y Educación; 1992.
9. Avalos Aquino J, Berrocal Aybar D, Grimaldo Salazar C, Puémape Purilla C, Tinoco Bendezú F. Planeamiento estratégico y de sistemas de información. Proyecto Final. [Tesis en Internet]. Perú: Universidad Alas Peruanas. Facultad de Ingenierías y Arquitectura. Escuela Académico Profesional de Ingeniería; © 2012 [citado 18/09/2015]. [Aprox. 41 p.]. Disponible en: <http://myslide.es/documents/articulo-cientifico-planeamiento-estrategico-de-sistemas-de-informacion.html>
10. Vega W, Umaña H. Diseño de Servicios Web Semánticos utilizando el desarrollo de software dirigido por modelos. Manizales (Colombia): Facultad de Ciencias e Ingeniería, Universidad de Manizales. Ventana Informática [Internet]. 2014 [Citado 17/09/2015]; (30): [Aprox. 22p.]. Disponible en: <http://revistasum.umanizales.edu.co/ojs/index.php/ventanainformatica/article/view/286/409>

