

• 10.5812/IRANJRADIOL.99151

A Systematic Review for Evaluating the Effects of Teleradiology

Bahlol Rahimi¹*, Sajjad Karimian²; Ali Rashidi¹; Amir Reza Razavi³

¹Department of Health Information Technology, School of Allied Medical Sciences, Urmia University of Medical Sciences, Urmia, Iran

²Student Research Committee, Urmia University of Medical Science, Urmia, Iran

³Radiology Clinic, Vrinnevi Hospital, Norrköping, Sweden

*Corresponding author: Department of Health Information Technology, School of Allied Medical Sciences, Urmia University of Medical Sciences, Urmia, Iran. Email: bahlol.rahimi@gmail.com

Abstract

Background:The use of telemedicine has received considerable attention in recent decades and it has partaken different applications such as teleradiology, telepathology, remote surgery, and so on. Telemedicine has been an approach with broad publications and a technology adopted by broad categories of healthcare users. The use of new technologies at each stage of teleradiology creates new challenges. Like any system, the lifecycle of the system development from production to maintenance requires actions to take.

Methods: Based on the PRISMA checklist, a robust search strategy was developed to identify all available studies meeting the inclusion and exclusion criteria. A literature search was conducted in March 2018 for a week for searching in PubMed/MEDLINE, Scopus, and Web of Science. We excluded articles published before 2000, non-English articles, all kinds of reviews, conference papers without full texts, notes and news, books, letters to editors, gray literature, authors' opinion, educational materials, and ad hoc implementation in the technical scope. All full-text literature in English concerning the assessment, evaluation, patient outcome, economics, and managerial aspects with a local or wide implementation in the form of original articles and case studies were included in this review. Then, data were imported into an Excel file.

Results: The articles were published between January 2000 and October 2018. A full, deep review revealed that most articles were related to the hospital environment. The financial evaluations comprised cost-effectiveness, cost prediction, initial cost reduction, and plummeting transporta-

tion and referrals of hospitals all over the world. The comparative evaluation studies usually compared and reviewed the type of pictures sent, the type of image formats, and the various tools for viewing the images in the hospitals. Therefore, the researchers decided to focus on the following themes: economic evaluation, technical evaluation of the system, evaluation of the PACS/RIS system, comparison of teleradiology and non-teleradiology systems, comparison of different instruments used in radiology systems, and the impact of these systems. Themes that were extracted in this article are as follow: comparison of methods or instruments, economic evaluation, technical evaluation, radiology information system (RIS) or picture archiving and communication system (PACS), and teleradiology impacts on hospital settings. With regard to the comparison of methods or instruments, articles compared two methods of teleradiology and non-teleradiology. In some papers, the authors examined various data entry tools and methods of compression. The reviewed articles indicated the impact of RIS or PACS on different aspects, such as workflow, efficiency, and effectiveness. Some articles aimed to evaluate economic, cost-effectiveness, cost-benefit, or any other cost estimation of the application of RIS or PACS.

Conclusion: In this paper, based on reviewing the context of existing literature, only were one or two of these dimensions discussed due to fewer articles published in relation to the broad aspect of teleradiology. In order to have a comprehensive view concerning the effect of radiological systems, it seems that we have to wait until various papers discuss different aspects of radiological systems and their impacts on economic or performance improvement.

• 10.5812/IRANJRADIOL.99150

Cobb Angle Measurement Decision Support System of Radiography Images in Patients with Idiopathic Scoliosis

Nazila Moftian¹; Taha Samad-Soltany¹; Zahra Salahzadeh¹; Hojjat Hossein Pourfeizi¹; Yousef Gheibi²; Amir Fazlollahi³; Peyman Rezaei Hachesu¹*

¹Tabriz University of Medical Sciences, Tabriz, Iran

²Tabriz University, Tabriz, Iran

³Commonwealth Scientific and Industrial Research Organization (CSIRO), Canberra, Australia

SCIENTIFIC POSTER PRESENTATION ABSTRACTS

*Corresponding author: Tabriz University of Medical Sciences, Tabriz, Iran. Email: rezaeip@tbzmed.ac.ir

Abstract

Background: Scoliosis is a three-dimensional deformity of the spine that is commonly assessed through measuring the Cobb angle.

Objectives: In this study, a Cobb angle measurement decision support system (CaMDSS) was presented to provide a repeatable and reproducible procedure for Cobb angle measurement in idiopathic scoliosis patients.

Methods: We used the OpenCV and the Numpy library for image processing and system design. A series of 98 anterior-posterior radiographs from patients diagnosed with idiopathic scoliosis were used to assess the repeatability and reproducibility of CaMDSS. Five independent observers performed the measurements, and each image was analyzed by each observer three times with a minimum interval of two weeks between measurements. Both the intra- and inter-observer reliability were obtained using the single measure intraclass correlation coefficient (ICC) value. The mean absolute difference (MAD) and the standard error measurement (SEM) were calculated for all corresponding intra- and inter-observer reliability estimates.

Results: Statistical results for the inter-observer analysis showed that the MAD between manual and CaMDSS was less than 3°, and the ICCs ranged from 0.94 to 0.99. The combined SEM between all five observers for intra-observer measurements of the manual method and CaMDSS was 1.79° and 1.27°, respectively. The inter-observer reliability of CaMDSS was excellent as the ICC value of 0.97 with 95% CI was obtained. The CaMDSS mean absolute difference was 2.18 ± 2.01 degrees.

Conclusion: Our study showed CaMDSS was an efficient and reliable method to assess the scoliotic curvature in Thoraco-Lumbar standing radiographs with the possibility of expediting clinic visits, ensuring the reliability of calculation, and decreasing the patient's exposure to radiation.

Keywords: Cobb Angle; Decision Support System; Scoliosis; Spine Deformity; Radiography; Image Processing

• 10.5812/IRANJRADIOL.99152

Designing a Structured System for Mammography Reporting

Sedigheh Emadi¹; Sina Kardeh¹; Sepideh Sefidbakht²; Alireza Shakibafard²; Omid Pournik³; Roxana Sharifian^{1,*}

¹Department of Management and Medical Information Sciences, Shiraz University of Medical Sciences, Shiraz, Iran

²Department of Radiology, Medical Imaging Research Center, Shiraz University of Medical Sciences, Shiraz, Iran

³Department of Community Medicine, School of Medicine, Iran University of Medical Sciences, Tehran, Iran

*Corresponding author: Department of Management and Medical Information Sciences, Shiraz University of Medical Sciences, Shiraz, Iran. Email: sharifianr@sums.ac.ir

Abstract

Background: Breast cancer is among the top causes of cancer-related mortality among females in both developed and developing countries. Screening for breast cancer plays a crucial role in the prevention of disease burden. Among various imaging modalities, mammography is currently considered the first step for the detection of breast lesions. The mammography data of breast cancer patients encompass a wide array of texts related to specific visual findings. Accordingly, unorganized mammography documents usually impede physicians' efforts to fully review the previous information in follow-up visits; hence, this not only affects clinical judgment and treatment planning adversely, but also adds to the financial burdens and workload imposed on the healthcare system. This further highlights the great potential of structured mammography reporting in the management of breast cancer patients.

Methods: In the first step, an expert panel consisting of two attending radiologists and a health informatician (all affiliated to the Shiraz University of Medical Sciences, Shiraz, Iran) reviewed related guidelines to determine the appropriate items, ontologies, and standard formats for data entry. These included radiology textbooks and the systematized nomenclature of medicine (SNOMED). In addition, 100 mammography reports were completely examined for data extraction and the creation of a template report. In the next step, the structure of the data registry was discussed among a group of radiologists and breast cancer surgeons during several sessions using Delphi technique.

Results: Overall, 119 fields were selected for data entry. Our survey showed that all of the contributing physicians believed that a structured reporting system for mammography can help standardize and reduce reporting time and errors. Following the completion of the template, a user interface was developed by the expert panel for integration in the cloud software workflow,