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"A STUDY ON ADVANCE DICOM ECG TECHNOLOGY IN 800 BEDDED TERTIARY CARE HOSPITAL"

Management

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ABSTRACT

DICOM ECG technology has the potential to improve the accuracy and efficiency of ECG diagnosis and treatment. It is significantly faster than traditional ECG reporting, taking only 29 minutes compared to 90 minutes. This can enhance the efficiency of ECG reporting and allow medical professionals to allocate more time to other tasks. However, challenges like technical issues, data security concerns, and resistance from staff or patients need to be overcome through proper planning and implementation. DICOM ECG technology is a valuable tool with the potential to enhance healthcare quality, but further research is required to assess its long-term effects and cost-effectiveness.

KEYWORDS

DICOM ECG technology, ECG reporting, cardiovascular diseases, ECG

INTRODUCTION

Willem Einthoven introduced the string galvanometer more than a hundred years ago [1], in 1924 he received the Nobel Prize in Medicine or Physiology for his invention [2]. 12-Lead Electrocardiogram (ECG) This is currently the most commonly performed cardiovascular test; Around 200 million ECGs are recorded worldwide every year. It is a fundamental diagnostic tool in clinical cardiology and is crucial for the management of patients with most cardiovascular diseases, including patients with acute myocardial infarction, suspected chronic myocardial ischemia, arrhythmias, heart failure and implanted cardiac devices. Unlike many other techniques in cardiology, the ECG is simple, small, portable, widely used, and inexpensive, making the ECG a particularly attractive diagnostic method. Advances in biomedical informatics and signal processing, combined with the available computing power of microcontrollers and processors, offer exciting new possibilities for ECG analysis, including improved filter effects, morphological feature analysis [3] and frequency content analysis [4], as well as vectorcardiography analysis [5] and ECG imaging [6]. Regardless, the appearance of the standard 12-lead ECG has remained the same and interpretation for direct visual assessment is still largely based on it. The ECG interpretation criteria have remained almost unchanged over the past 25 years [4]. Limitations Adjusted Using These Conventional Criteria The ECG, however, has an important unmet clinical need in various areas of cardiology.

The DICOM standard is a set of rules that makes medical images possible to switch between image detection systems (e.g., X-ray, ultrasound, nuclear technology). cardiology, computed tomography, magnetic resonance), image archiving systems e imaging stations in hospitals. commonly used The DICOM standard also contains diagnostic rules ECG waveforms. The standard was manufacturer-independent created in 2000. But no longer an ECG manufacturer sold electrocardiographs The supports the DICOM waveform standard. It was spring in 2006, before the first ECG manufacturer announced its own model Introduction of the DICOM standard for diagnosis electrocardiographs. ECG interface can connect to DICOM image storage servers. DICOM Currently, servers are available in most hospitals' environments. This allows you to share all stored DICOM ECGs and downloaded from the hospital's DICOM servers. How mature and widely used communication interface for medical imaging modes. In addition to the data also supports DICOM reports and workflows events such as programming operations. DICOM is still their Manufacturer-independent distribution. This article focuses on Advantage of using the DICOM ECG standard for IT infrastructure for hospitals and clinics.[5]

Background of the study

The DICOM ECG reporting study is a research project or clinical in that aims to standardize the storage and exchange of electrocardiogram data in medical imaging systems using the DICOM format. DICOM is a widely adopted standard for medical imaging data, and its extension to ECG data can improve interoperability, data management, and analysis in healthcare settings.[2]

Cardiovascular diseases (CVDs) are the leading cause of death globally, taking an estimated 17.9 million lives each year. More than four out of five CVD deaths are due to heart attacks and strokes, and one third of these deaths occur prematurely in people under 70 years of age. CDC- nearly 47% of sudden cardiac arrest-related deaths occur before a patient reaches the hospital. Deaths due to cardiac arrest have increased by 53 percent in the last five year.[5] Timely admission to hospitals has increased the survival rate to 32.5 percent. Registry of the (ICMR) shows at some places it even takes 900 minutes for transportation. Beyond 180 minutes, the heart muscles suffer irreversible damage. About 1.15 lakh people die due to cardiac arrest every day in the world' World Heart Day 2022: 70% Of Heart Attack Deaths in India Last Year Occurred In 30-60 Age Group The number of deaths due to heart attacks in India has remained consistently over 25,000 in the last four years, and over 28,000 in the last three year[4]

METHODOLOGY:

The research methodology for this study is a Longitudinal Study. The aim of this study is to compare the quality of DICOM ECG reporting with traditional ECG reporting and assess its effectiveness in the diagnosis of cardiovascular diseases. The sample selection for this study will be based on a random sampling method, with patients who have undergone DICOM ECG reporting within a specific time frame being included in the study. The sample size for this study will consist of 200 ECG reporting done by DICOM technology and 200 traditional ECG reporting. The study will be conducted in an 800 bedded super specialty hospital in Pune city, and data will be collected from multiple sources, including medical records, patient files, HMIS, and the Porter system for duration of 50 days.

The inclusion criteria for an ECG study are the ECG must have been recorded while the patient was an inpatient in a hospital, the ECG must have been recorded at the location where the study is being conducted the ECG must have been recorded during the time period that the study is being conducted. The exclusion criteria for an ECG study are the ECG must not have been recorded while the patient was an outpatient in a hospital, the ECG must not have been recorded in the emergency department of a hospital the ECG must not have been recorded in the intensive care unit of a hospital.

The data collected included the time of ECG recording, the time of transmission to the reporting consultant, the time of reporting, and any

other relevant information. The data analysed using statistical methods to compare the quality of DICOM

AIM:

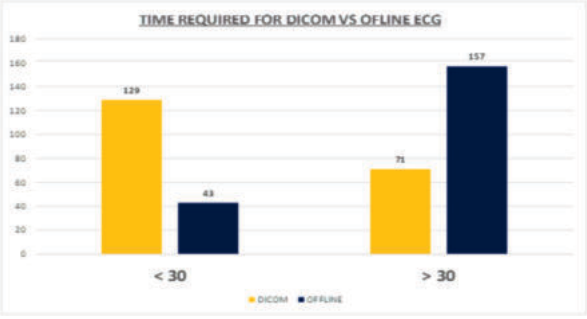
The study aims to evaluate the implementation and benefits of advanced DICOM ECG technology in a 800-bedded tertiary care hospital

OBJECTIVE:

1. To compare the time & performance between advanced DICOM ECG technology and traditional ECG Reporting.
2. To observe the feasibility and effectiveness of implementing advanced DICOM ECG technology in the hospital.
3. To identify any potential challenges or barriers to the successful implementation of advanced DICOM ECG technology in the hospital.

RESULT:

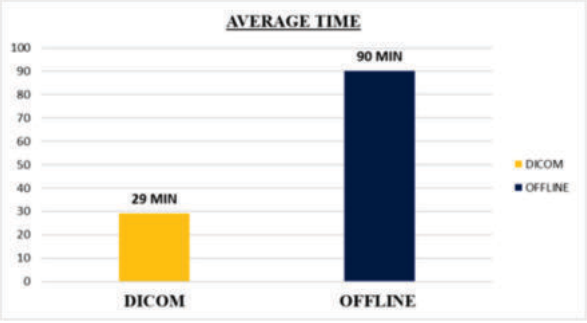
1. Time Required For Dicom Vs Ofline Ecg



Graph :1

The graph shows the time required for DICOM vs offline ECG. The blue bars represent the time required for DICOM ECG reporting, and the yellow bars represent the time required for offline ECG reporting. The time was distributed in <30 min & >30 min. The blue bars (DICOM ECG) are consistently higher than the red bars (offline ECG reporting). This means that it takes longer to process a DICOM ECG than an offline ECG.

2. Average Time



Graph: 2

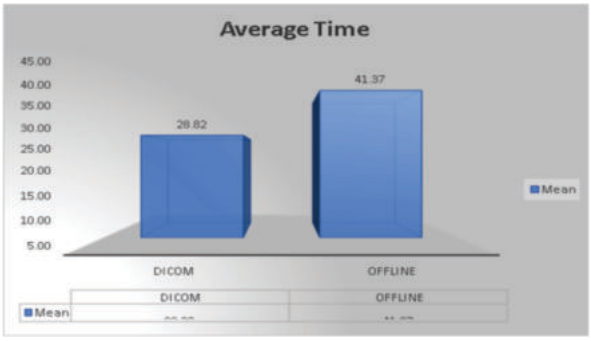
The graph shows the average time required for ECG reporting via DICOM and traditional ECG reporting. The blue bars represent the time required for DICOM ECG reporting, and the red bars represent the time required for traditional ECG reporting. The average time required for DICOM ECG reporting is 90 minutes, while the average time required for traditional ECG reporting is 29 minutes. The maximum time required for DICOM ECG reporting is 29 minutes, while the maximum time required for traditional ECG reporting is 90minutes.The time required for DICOM ECG reporting varies more than the time required for traditional ECG reporting.

3. Mean Time

Table -1

Average time	N	Mean	SD	SE	t-Value	P-Value	Result
DICOM	200	28.82	16.61	1.18	-5.358	0.00000014	Sig
Offline	200	41.37	28.58	2.02			

Unpaired t-test is carried out for comparison of average time on DICOM and Offline. P-Value less than 0.05. Indicates significant difference in average time.



Graph: 3

The reporting time required for DICOM ECG was impressively fast, taking only 29 MIN. However, traditional ECG reporting took a considerably longer amount of time, with a reporting time of 90 MIN. It's clear that the DICOM ECG technology is a game-changer in terms of efficiency and speed. hospitals have begun implementing the DICOM ECG machine on many floors. Unpaired t-test is carried out for comparison of average time on DICOM and Offline. P-Value less than 0.05. Indicates significant difference in average time.

This news is great for both patients and medical professionals as it means that ECG reporting can be done even faster and more accurately than before. Observing the positive impact that this new technology will have on the healthcare industry is truly inspiring.

DISCUSSION:

The study highlights the potential benefits of DICOM ECG technology for healthcare, despite some implementation challenges. It's important to address technical issues, data security concerns, and staff or patient resistance. However, the study has limitations, as it was conducted in a single hospital over a short period and didn't assess implementation costs. Nevertheless, further research is needed to evaluate its long-term impact and cost-effectiveness.

To ensure proper use, nursing staff will undergo comprehensive training on DICOM ECG technology, covering its benefits, diagnostic role in cardiovascular diseases, and effective operation. Training will be conducted by experienced professionals and assessed through a post-training evaluation.

CONCLUSIONS

The study reveals that DICOM ECG technology offers a significant speed advantage, reporting in 29 minutes compared to traditional ECG's 90 minutes, enhancing efficiency. It also maintains the same level of accuracy, assuring consistent patient care. Implementation challenges exist, including technical issues and security concerns, but can be managed through careful planning. Overall, the study underscores the potential of DICOM ECG technology to enhance healthcare quality, necessitating further research for long-term effects and cost-effectiveness.

Recommendations

Based on the findings of this study, the following recommendations are made:

- Hospitals should consider implementing DICOM ECG technology to improve the efficiency and accuracy of ECG reporting.
- Hospitals should carefully plan and implement DICOM ECG technology to overcome any potential challenges.
- Further research is needed to assess the long-term effects of DICOM ECG technology and to determine its cost-effectiveness.

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