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ISSN: 2168-975X
Brain Disorders & Therapy

Opinion Article

Information Technology in Neurology and Central Nervous System

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DESCRIPTION

The simplest definition of medical informatics is the use of computers in the medical field. There may be more than one definition. The study, creation, and application of structures and algorithms to enhance the management, analysis, and sharing of medical data is the definition of biomedical informatics, a broad and developing field. The integration of data, information, and tools required using that data and expertise in the decision-making process related to patient care is the ultimate goal of biomedical informatics. Biomedical informatics differs from other medical disciplines where the focus is on information content by concentrating on the structures and algorithms required to modify the information.

Van Bemmel defines medical informatics as the theoretical and applied aspects of information processing and communication based on expertise and knowledge gained from processes in medicine and health care. Although there are many uses for computers in healthcare, the field of medical informatics can be organized or segmented into the following domains:

- Signal processing: computer-aided examination of electro- and neurophysiological data
- Computerized neuropathology analysis and image processing
- Systems for tracking health information, such as electronic health records
- Clinical tools and decision support systems
- Platforms for telemedicine and telehealth
- Medical communications on the internet

See the patient education articles Family Medical Records, CT scan, Magnetic Resonance Imaging (MRI), Understanding X-rays, Electrocardiogram (ECG), and Electromyography on eMedicineHealth for great patient education resources.

Computers are helpful tools for processing electrical signals from different sources, such as the ECG for detecting heart arrhythmias and the EEG for analysing and detecting spikes and sharp waves that the neurologist may occasionally miss. Although automated signal processing for most routine EEGs is not the standard, algorithms for signal-to-noise detection are increasingly being used in continuous records of hospitalised patients, both in real time and over the course of several hours or days of records.

Computer-assisted signal processing can help with waveform analysis, Compound Muscle Action Potentials (CMAP) and Sensory Nerve Action Potentials (SNAP) measures, as well as amplitude and area quantitative measurements in nerve conduction investigations and EMG. A tailored report can be created for simple detection of abnormal results and ultimate diagnosis when used in conjunction with a comparison system for reference range values. In general, computerized EMG can aid a neurologist or electromyography who is less experienced in the early diagnosis of minor EMG alterations.

Image processing and pattern recognition are crucial areas in medical informatics, particularly in neuroinformatics, a growing discipline for brain MRI, SPECT, and PET scans, as well as other Cutting-Edge Methods (fMRI). For instance, evaluating geographically dispersed patterns of brain activation in fMRI data sets using computational analysis aids in defining functional brain structures and determining the aetiology of numerous neurologic illnesses. In order to improve signal-to-noise detection, the FDA is increasingly approving AI-enabled algorithms that analyse neuroimaging and pathology materials.

More thorough records than ever before are needed for good medical care. More organized and thorough records are required for malpractice protection. More documentation is now needed by third-party payers to support the costs incurred by physicians' acts. The clinical records of patients must be maintained using more effective and economical means, given the state of the economy today. A significant paper entitled The Computer-Based Patient Record: An Essential Technology for Health Care was published in 1991 by the Institute of Medicine (IOM). The paper promoted the use of Electronic Health Records (EHRs), also known as Computer-Based Patient Records (CPRs), as the norm for medical care.

The report described the EHR as a continuous chronological history of a patient's medical care linked to various aids for their user, such as programmed reminders and alerts produced by

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Received: 01-Sep-2022, Manuscript No. BDT-22-18438; **Editor assigned:** 05-Sep-2022, Pre QC No. BDT-22-18438 (PQ); **Reviewed:** 19-Sep-2022, QC No. BDT-22-18438; **Revised:** 26-Sep-2022, Manuscript No. BDT-22-18438 (R); **Published:** 03-Oct-2022, DOI: 10.35248/2168-975X. 22.11.168.

Citation: Mehtar R (2022) Information Technology in Neurology and Central Nervous System. Brain Disord Ther 11:168.

decision-making systems. The report stated that EHRs "can respond to health care's need for a 'central nervous system' to manage the complexities of modern medicine from patient care to public health to health care policy." The Computer-Based Patient Record Institute was founded as a result of the IOM report. This advocacy organization is backed by businesses in the healthcare, insurance, data-processing, and computer industries as well as by some professional associations.