COMPUTER ASSISTED MEDICAL HEALTH SYSTEM FOR THE BENEFIT OF HARD TO REACH RURAL AREA

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Abstract

It is a known fact that medical practitioners seldom prefer to work in rural areas. For providing medical help to rural population more particularly to people from hard to reach areas computer assisted medical health system is developed. This paper discusses the method for fast clinical assistance in hard to reach places & its applicability.

Keywords: CAMH, Gynecology, emr

1. Introduction

Decision making by the clinician in the management of his patients is a highly intellectual activity which involves:

1.   His skill in gathering and evaluating new information about the patient,

2.   His ability to readily recapitulate the information he has already logged in the patients record and,

3.   His ability to effectively utilize the large body of medical knowledge which expresses the relationship between the data describing each individual patient and the diagnostic, prognostic and therapeutic options available for managing the patients problems optimally. (1)

To carry out this intellectual activity medical professionals are not available in rural areas. Unavailability of health care in rural areas is the outcome of paucity of medical professionals. Even the Government is unable to retain Doctors for rural areas.

A national level workshop was held in July 2011 to identify implementation research priorities. Following important questions emerged as highest priorities (2).

1. How can doctors, nurses and technicians be attracted in rural and hard to reach areas?

2. How can mothers, newborns and children needing health care be reached in hard to reach places?

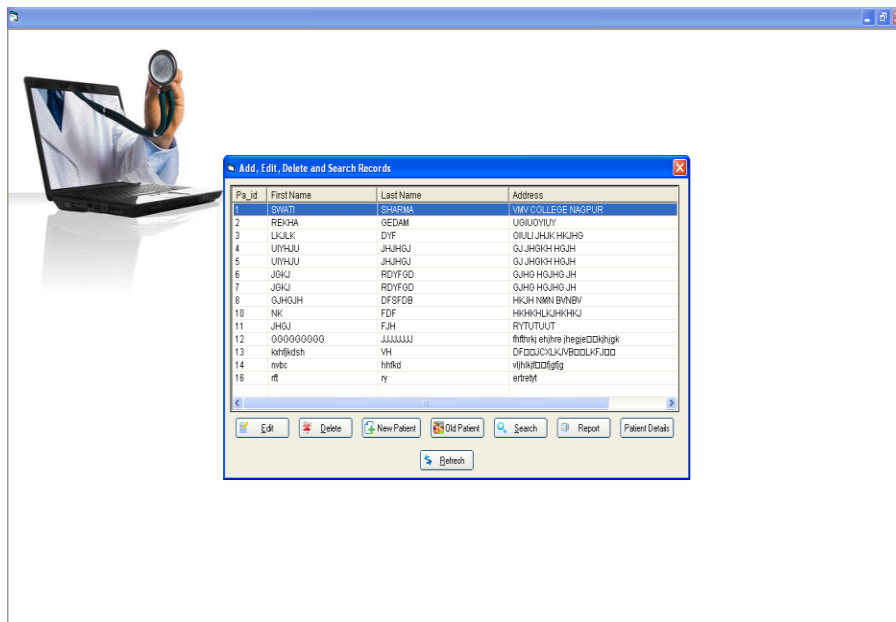3. How can quality of health care received by mothers, newborns and children in health facilities be improved?

Using Information Communication Technology all the three questions can be solved. In this paper a Computer Assisted Medical Health System (CAMH) for fast clinical assistance in Gynecology and Obstetrics in the hard to reach places is described which may be extended across most of the disciplines of medical sciences. Not only government but private medical practitioners and hospitals may get involved in this activity and therefore success on implementation of the method is guaranteed.
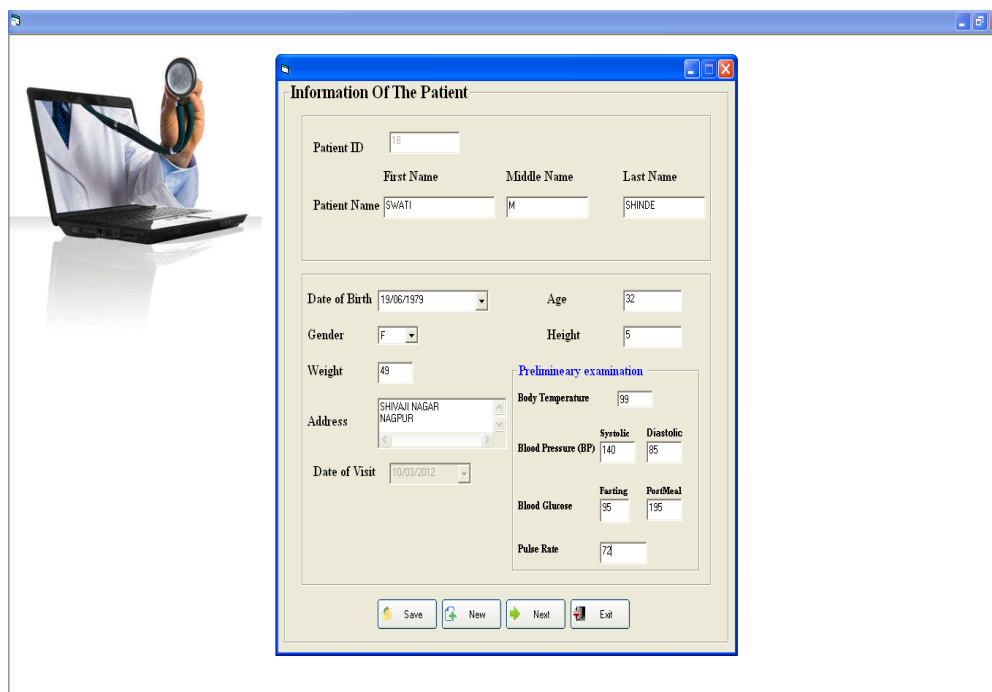
2. Methodology

The model of medical health system described here is hoped to provide a solution to much of the health problems faced by rural populous. Properly designed Information Communication Technology based programmes have been generated to enable the semi-trained personnel to collect data using pre defined questions and derive conclusion. A pre meditated computer programme in the discipline, Gynecology; has been developed with proper medical data base at the back end. Also a provision for collecting and recording some primary data on temperature, blood pressure, blood glucose, pulse rate etc of the patient has been made. These measurements are possible with some hardware attachments such as devices for recording temperature, blood pressure, blood glucose, pulse rate, etc. The paramedics trained to operate this computer system will collect the data from the patients with the help of the computer based health care system which itself will provide decision about the ailment and possible treatment. The paramedics will forward this data via wireless connectivity to the Registered Medical Practitioner under whom the paramedics is working. The RMP after making some further enquiry, if necessary, will convey/forward the required treatment. A pharmacy diploma holder accompanying the paramedics will be carrying necessary medicines and shall deliver the medicine to the patient. The patient will be asked to report the next day for further assessment. If the condition of the patient remains unaltered may be within two days, he/she will be referred to the concerned RMP for further treatment.   This tool will be superior to the ability of the semiskilled personnel/paramedics in retrieving and processing information provided by the patient.

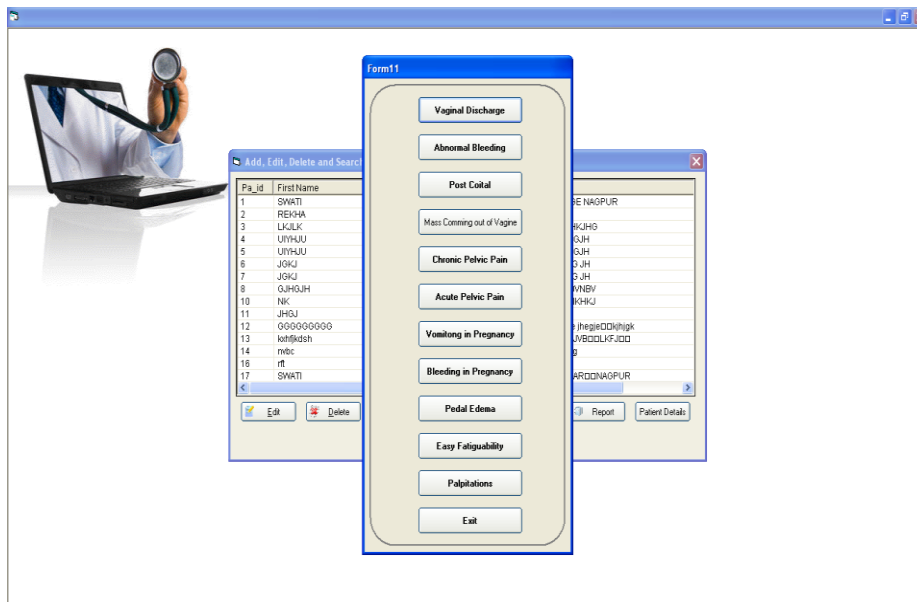## 3. Content Of The ICT Based Computer Assisted Medical Health Care System:

The front end shows a questionnaire of yes/no type for each of the complaints related to Gynecology and Obstetrics. Screen shots 1 to 6 show the patients data, symptomatic questionnaire, diagnosis and report of the patient.   The back end will have medical knowledge data related to the complaint
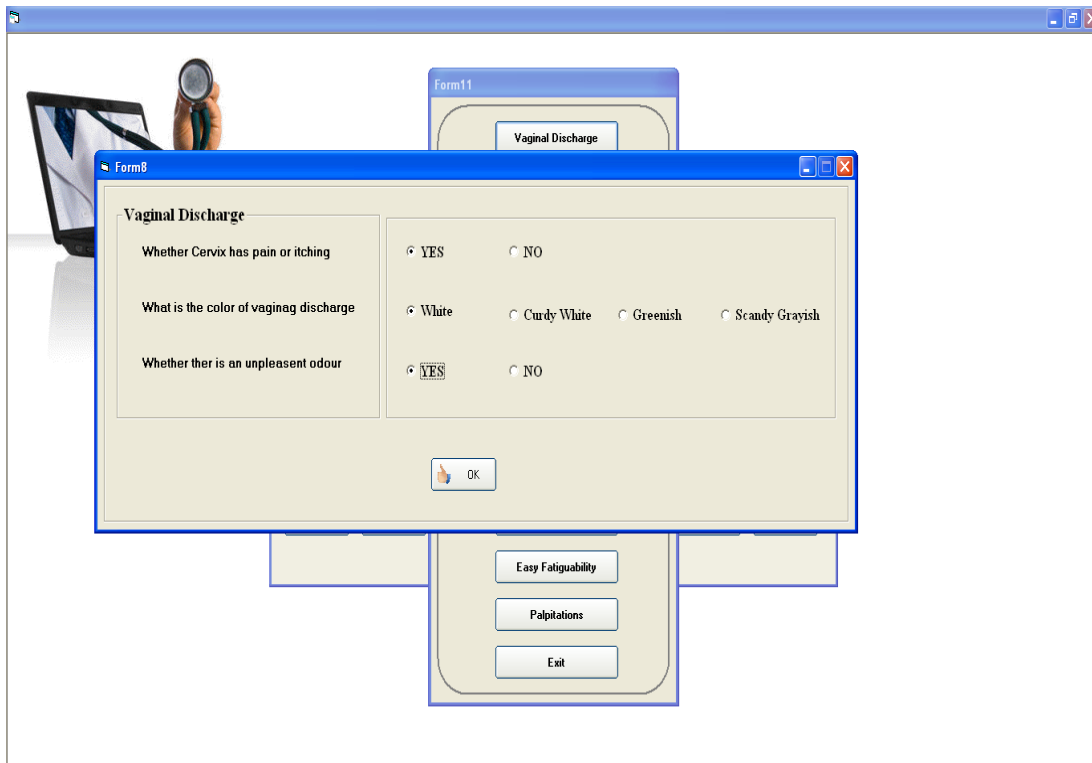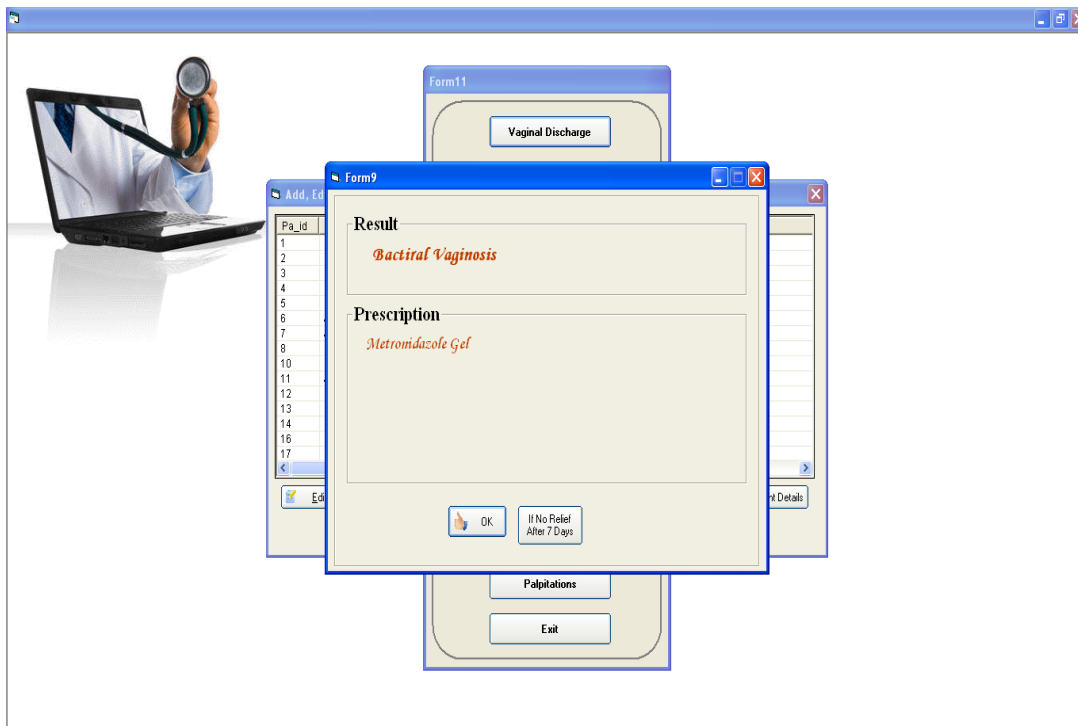
Screen Shot 1 - Patient Information
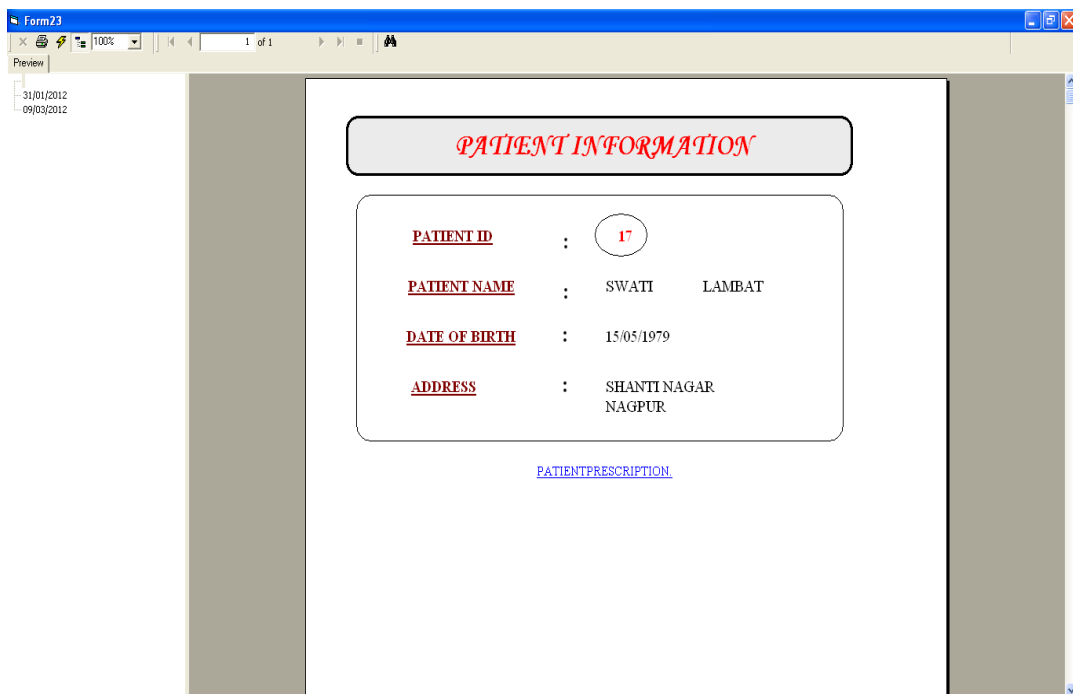

Screen Shot 2 - Input Patient Information

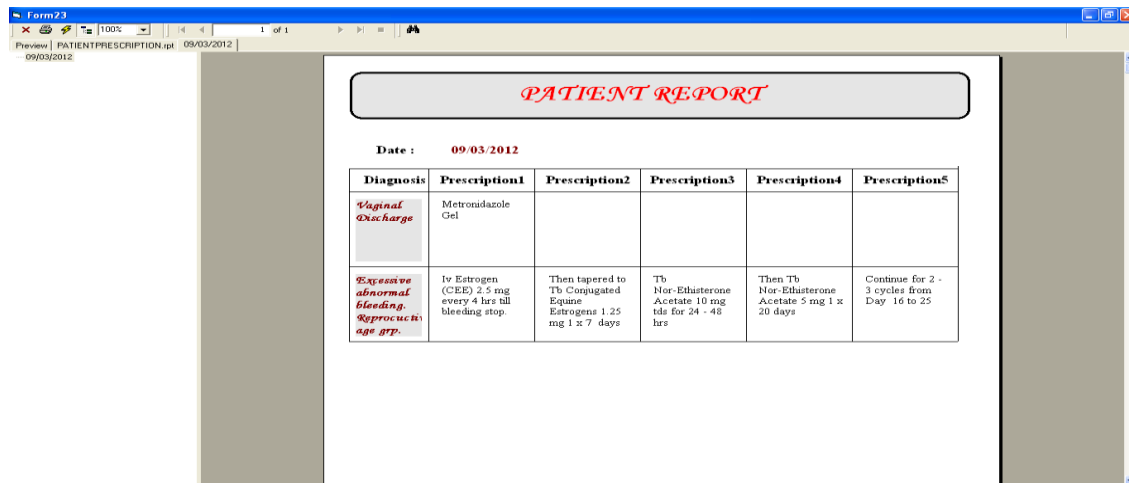**Screen Shot 3** - Gynecology Symptoms

Screen Shot 4 - Gynecological Problem's Symptoms

Screen Shot 5 - Gynecological Problem's Result

Screen Shot 6 - Patient Report

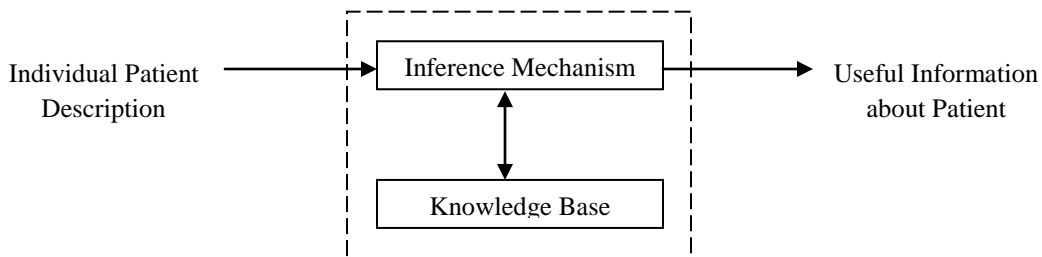## 4. Different Approaches Adhered By The CMD:

The Computer Assisted Medical Decision Making System (CMD) adheres to the following approaches:

1.   Categorical Approaches: Deterministic, algorithmic, flow-chart or protocol-based. They provide clear cut guides to action based on clear cut criteria. Indeed the concept of a protocol as a clinical algorithm arose out of the experience of research workers with computers and information science.

2.   Probabilistic Approaches: Statistical decision approaches and statistical inference, Bayesian approaches, discriminate analysis, Multivariate analysis; Clinical analysis-case based reasoning and exploratory analysis etc. The entire above are derived from the same perspective-to develop predictive power through the analysis of past data to support future decisions.

3.   Artificial Intelligence Approaches: Production rule systems based on first order predicate calculus-conditional rules, IF/THEN; Cognitive models based on generalized set covering (GSC) theory; Frame descriptions; Semantic networks; Hypothesis and test (abduction); and Artificial Neural Networks (ANNs).

Out of the above approaches, two simple and easily useable by the computer scientists for preparing software tools are described below.

5. General model of CMD

Dr. James Reggia (3) has described a general model of CMD system as depicted in Fig.1.

The input is typically a description of some specific patient (age, symptoms and signs, past medical history etc.) and the output is useful information about that patient (e.g. appropriate screening tests, diagnosis, therapy plan etc). The CMD system itself contains two basic components:
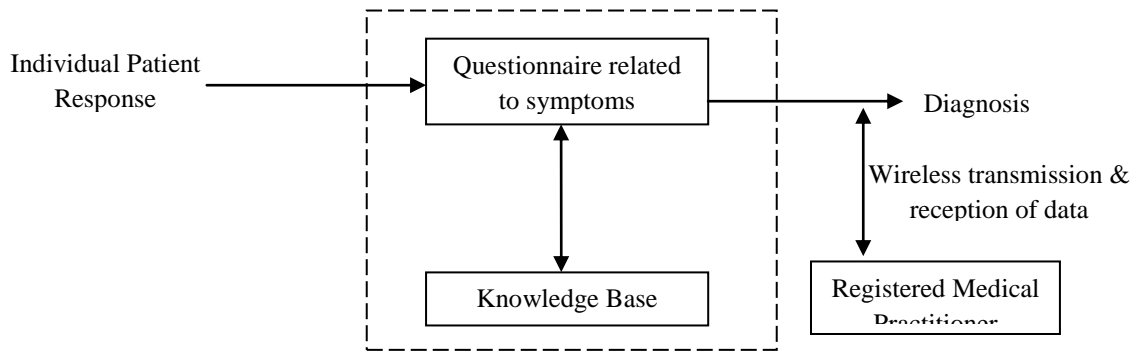
1.   A knowledge base and
2.   An inference mechanism.

6. Production rule systems

Artificial Intelligence seeks to capture the expertise of humans largely through the use of non-numeric symbol processing. The CMD mimics human decision making, its reasoning is transparent and it has an explanatory capacity. The AI approach most widely used in CMD research is that of rule-based deductions. Medical knowledge is represented as a set of conditional rules or productions. Each rule/production has the basic form, IF/THEN.

7. Camh Model

Fig.2. depicts CAMH model used in the development of computer programme to record patient – Para-medico dialogue and diagnosis.

For our system the knowledge base is a collection of encoded knowledge that is needed to solve problems in some particular medical area (Gynecology). The inference mechanism is a program that, given a case description, uses the information in the knowledge base to generate decision. Medical experts have provided the knowledge for design and development of the supporting software for the CAMH system for being used by the health care service personnel.

7. Conclusion

It is concluded that the CAMH model used in developing computer programme can be extremely useful in providing medical help to people of hard to reach area. The system can be handled by the semiskilled/paramedics so that the patients get immediate medical assistance. Doctor based in the city area will offer diagnosis and treatment to the patient. Such a system can be extended across all specialties of medical sciences.

Acknowledgement

References:

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