WEB BASED COUNSELLING SYSTEM WITH ELECTRONIC PRESCRIPTION FOR RURAL AREA

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ABSTRACT
The advances in Medical Science, Biomedical Engineering, Telecommunication and Information Technology are offering wide opportunities for improved healthcare. Telepsychiatry is the branch of Telemedicine, which allows effective way to increase access to psychiatric care for individuals living in underserved areas. Some areas in Asia have no medical facilities and proper mental healthcare is unavailable. Therefore, online counselling system is required. It can connect patients, psychiatrists, physicians, and other healthcare professionals through live interactive 2 way audio-video communication. This technology offers the best options for delivering healthcare for rural & geographically distant population spread across India and is used to provide patients with second opinion. The paper describes Web Based Counselling System with E-Prescription for Rural INDIA. The windows based system is constructed using Ajax software. The first step involved developing a prototype system; we repeatedly discussed system development with people in charge of a clinic. Next, we conducted a survey in 3 clinics and carried out interviews of 10 patients about the online counselling system; among them 7 patients were regular visitors of respective clinics and 3 patients were the first time visitors. We also discussed and analyzed the interviews.

KEYWORDS
Prescription, Rural Healthcare, Telecommunications, Telemedicine, Telepsychiatry and Video Conferencing

1. INTRODUCTION
THE idea that doctors might treat patients without being in the same room with them is not new. Likewise, doctor-to-doctor consultation does not require physical proximity. Telemedicine is the use of modern information technology, especially two-way interactive audio/video telecommunications, computers, and telemetry to deliver health services to patients in remote area and to facilitate information exchange between primary healthcare physicians and specialists at some distance from each other. More recently, the internet has become widely available for general use, including telemedicine. The use of teleconferencing by business has spurred development of the technology that is now being explored for clinical applications. Telepsychiatry is the application of telemedicine in the field of psychiatry, which is playing vital role in the mental healthcare for the patients staying in the underserved areas. In country like INDIA, despite making huge strides in overall development, the health coverage to majority of the population is still a distant dream. The population is predominantly rural and distributed in distant geographical locations.

Providing healthcare to rural population is one of the most important priorities today. Figure 1 shows the area wise (e.g. urban, semi urban and rural) distribution of qualified doctors in percentage.

![Figure1: Distribution of Qualified Doctors in %](image)

The uneven distribution of specialist doctors in urban and rural areas and various reasons behind it are inadequate medical facilities, lack of investment in healthcare in rural areas, professional isolation and less monitory incentives for the doctors. One way to make this distribution even irrespective of the geographical location is by making available the specialist physician to the
patients staying in the underserved areas in the virtual environment. For this the web based system is developed to provide the time and cost effective counselling for the patients staying in the underserved areas.

2. SYSTEM REQUIREMENTS
The system consists of hardware, software and communication channel. Interface is required for the hardware and software and the channel for connecting two geographically distant locations across the world. The hardware part consists of computer or laptop or palmtop or smart phones, scanner, printer, speakers, web camera, video conferencing unit, etc, while the software part enables the acquisition of images, films, reports; in short patients information; and the communication channel connects the geographically distant locations.

In early days, for the purpose of communication a lease line was used, but now a day many options are available; e.g. ISDN, Lease Line, Wireless LAN/WAN, ATM, PSDN, etc.

3. SYSTEM WITH E-PRESCRIPTION
Telediagnostics and teleconsultation is the next step in the telemedicine. It uses the information and communication techniques to enable the diagnostics. Tele-psychiatry practice is identical to ‘in-person’ practice, except that patient and psychiatrist meet over the telephone, with or without video. If primary healthcare centre/home of patient has a webcam, then Skype, Microsoft Net Meeting or any of the common messaging services is used for video conferencing. In most cases video is not necessary for psychiatric evaluation and treatment, but if primary healthcare centre has a webcam, video certainly adds a great deal to the relationship. Where a primary healthcare centre is connected to hospitals via internet.

3.1 GUI of the System:
Website of System is developed based on Ajax software and open end software Skype is used, which will help the end user to carry out the video conferencing and at the same time secure data transfer is guaranteed. Graphical user interface makes this system user friendly.

The system provides the sign up facility for first time user and a login facility for existing user. In this case, user can be a psychiatrist or a patient. The video conferencing is carried out with the help of Skype software. To start the net meeting, psychiatrist and patient need to enter the valid code assigned to them. If the code entered is not the valid one, then the user will be asked again to enter the valid code indicating that the code entered was not the valid one. GUI of the Web Based Counselling System developed by the authors is shown below.

Figure 2: Screenshot of the Patient Access Page
Figure 2 shows the screenshot of the patient access page. It patient is a first time visitor of the Web Based Counselling system then he need to sign up to the system and need to create a user name and the password for the further use. If he is a already existing patient then by giving his user name and password he can log in to the system.

Figure 3: Screenshot of the Physicians Access Page
Figure 3 shows the screen shot of the physician’s access page. After logging into the system the patient from PHC centre and physician who will be at the hospital/clinic can carry out the net meeting through video conferencing. During the video conferencing the psychiatrist can record the video of the web based counselling session.

3.2 Electronic Prescription for Patient:
In traditional process, after medical examination, the physician prescribes medicines to the patient
on a prescription paper sheet with physician’s real
signature.
In ‘Web Based System’, patient and physician are
at different geographical location, so examination
is carried out through video conferencing. Internet
based prescription (E - Prescription) is generated
without physicians real signature. The link to this
page is provided through a Web Based Counselling
System. After secure login by the physician, he
will be able to access the link of E-Prescription. To
prevent being altered or forged and reused by
unauthorized users, E – Prescription window is
having secure login. Figure 4 shows the login
window for E – Prescription. After the successful
login physician will go to the actual form of
Electronic Prescription. The electronic
prescription contains fields like Patients Name,
Address, PHC Code, Date, Age and details of
medicines as shown in figure 5. The ADD button is
provided for adding the number of medicines in the
prescription. The physician can save the
information to database as well as will generate the
report of the same. Figure 8 shows the
electronically generated prescription. Form of E –
Prescription is shown in the figure 5.

![Figure 4: Login Window for the Physician](image)

![Figure 5: Electronic Prescription](image)
As the prescription is electronically generated, it does not require physician’s real signature. Physician will email this E – prescription to primary healthcare centre. Figure 6 shows the E – Prescription report generated.

3.3 Payment Issues:
Reimbursement is one of the important though neglected issue in most of the web based counselling systems. Electronic money is rare in rural India and thus direct cash transaction is carried out in most of the places. The patient pays fees at primary healthcare centre (PHC) which includes consulting fees of physician and service cost of primary health care centre. PHC will issue the payment receipt of the said amount to patient and will transfer this money to respective physician.

4. SURVEY FINDINGS
The survey was conducted in 3 clinics and in all 10 patients were interviewed at the various stages of the system development. Among the 10 patients 7 patients were regular visitors of the respective clinics and 3 were first time visitors. The interview questioner was as follows:

- Do you know what online counseling is?
- Prior to online counseling which information you would like to know?
- Are you bothered about the security issues of the online counseling system?
- Would you like to comment on the time required for the Online counseling Vs Classical counseling method?
- Would you like to comment on the money spent (consultation fees + traveling cost) required for online counseling Vs classical counseling method?
- Will you prefer online counseling over the classical counseling method?

The table 1 shows the results of the interviews carried out. The overall analysis shows that the patients who are regular visitors to the clinic are more interested in the web based counselling system as compared to that of the first time visitors. Overall impression of the new system was good; as the counselling was carried out in the virtual environment with the help of in the audio visuals.

Following are the results of the interviews carried out during the various system development stages.
5. **END USER ANALYSIS**

The effect of Web Based Counselling System on stakeholders and the end user analysis was carried out to find out the importance of system in the healthcare. Table 2 shows the survey findings carried out in three clinics and end user analysis carried out in city of Pune, Maharashtra State (INDIA) during the various stages of system implementation. The table covers the various points such as number of patients visiting psychiatrist per day, the money spent by the patient in Indian Rupees (INR) to visit psychiatrist in person and through the Web Based Counselling System and time spent by the patients to visit psychiatrist in person and through the Web Based Counselling System. The point 7 in the table shows the Primary Healthcare Centre (PHC) fees plus the consultation fees of the psychiatrist, paid by the patient when he used the Web Based Counselling System.

Table 3 shows the survey findings for 7 patients from 3 clinics. All the seven patients were the regular patients of the respective clinics; who have used classical counselling system till now and who are now using Web Based Counselling System. The table shows the data collected from these 7 patients based on time and money spent by them to visit psychiatrist one time by using classical counselling system and by the Web based counselling system. The data clearly shows that Web Based Counselling system is more efficient as compared to Classical System with respect to time and the money spent by the patients.

### Table 1: Results of the Interview Regarding the Web Based Counselling System

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>1. Do you know what online counseling system is?</td>
<td></td>
</tr>
<tr>
<td>Yes or partially yes</td>
<td>8</td>
</tr>
<tr>
<td>No</td>
<td>2</td>
</tr>
<tr>
<td>2. Prior to the online counseling which information you would like to know?</td>
<td></td>
</tr>
<tr>
<td>Should be able to see the face of psychiatrist to get a feel of actual counseling session</td>
<td>7</td>
</tr>
<tr>
<td>No Comments</td>
<td>3</td>
</tr>
<tr>
<td>3. Are you bothered about the security issues of the online counseling system?</td>
<td></td>
</tr>
<tr>
<td>Partially Yes</td>
<td>2</td>
</tr>
<tr>
<td>No</td>
<td>2</td>
</tr>
<tr>
<td>Not sure</td>
<td>5</td>
</tr>
<tr>
<td>4. Would you like to comment on the time required for the online counseling Vs Classical counseling method?</td>
<td></td>
</tr>
<tr>
<td>Less time required as compared to classical method</td>
<td>8</td>
</tr>
<tr>
<td>Not sure</td>
<td>2</td>
</tr>
<tr>
<td>5. Would you like to comment on the money spent (consultation fees + traveling cost) required for online counseling Vs classical counseling method?</td>
<td></td>
</tr>
<tr>
<td>Money spent is lower as compared to classical method</td>
<td>7</td>
</tr>
<tr>
<td>Does not make much difference</td>
<td>5</td>
</tr>
<tr>
<td>6. Will you prefer online counseling over the classical counseling method?</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>6</td>
</tr>
<tr>
<td>No</td>
<td>1</td>
</tr>
<tr>
<td>Could not decide</td>
<td>3</td>
</tr>
</tbody>
</table>

### Table 2: Survey Findings

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>1. Approximate number of patients per psychiatrist per day</td>
<td>15</td>
</tr>
<tr>
<td>2. Patients visiting psychiatrist per day from actual city of Pune in percentage</td>
<td>30 to 60%</td>
</tr>
<tr>
<td>3. Patients from rural areas (within 100 Km radius from city of Pune) visiting psychiatrist per day in percentage</td>
<td>40 to 50%</td>
</tr>
<tr>
<td>4. Consultation fees per patient in INR</td>
<td>200 to 250</td>
</tr>
<tr>
<td>5. Minimum cost in INR for traveling distance of 100 Km</td>
<td>150 to 200</td>
</tr>
<tr>
<td>6. Minimum time required in minutes to travel 100 Km of distance</td>
<td>150 to 190</td>
</tr>
<tr>
<td>7. Total cost in rupees to visit psychiatrist through Web Based Counselling System. (Fees of PHC centre + Consultation fees of the psychiatrist)</td>
<td>150 to 200</td>
</tr>
<tr>
<td>8. Time spent in minutes by the patients staying in rural areas (within 100 Km radius from city of Pune) to visit psychiatrist in person (Classical method)</td>
<td>270 to 380</td>
</tr>
<tr>
<td>9. Time spent in minutes by the patients staying in rural areas (within 100 Km radius from city of Pune) to visit psychiatrist through Web Based Counselling System (Online method)</td>
<td>60 to 90</td>
</tr>
</tbody>
</table>

*1USD = 47 INR*
The graphical presentation of data collected from 3 clinics when patients chose to visit psychiatrist in person is shown in figure 7. Figure 8 shows the graphical presentation of the data collected from the same patients when they visited psychiatrist through the Web Based Counselling System.

![Figure 7: Graphical Analysis of Cost and Time in Classical Counselling System](image)

![Figure 8: Graphical Analysis of Cost and Time in Web Based Counselling System](image)

6. CONCLUSION

This research work describes the cost and time effective Web Based Counseling System with Electronic Prescription for the rural area. The system utilizes technology in a new way to provide medical expertise to remote areas or to provide second opinion in already developed healthcare systems. It features the secure transmission of patient’s medical prescription from hospital to primary health care centre via internet. The developed system with E – Prescription will not be useful for people who struggle with suicidal thoughts. As it is better off with a psychiatrist who lives in their community, who can admit the patient to a local hospital if required.

The success of the project would not be possible without a qualified psychiatrist, who is willing to take part in this type of project. Reliable technology and an IT staff, who is readily available for assistance, make the project effective.

Advanced research is needed to improve efficiency and to solve serious problems of privacy and management of drug history for patients and security for medical professionals.

With adequate care most individuals with a mental illness can be productive citizens contributing to our society. In the near future the use of technology in the innovative way will prove to be boon for the rural healthcare.

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