

Aushadh Nishtha: A Mobile Based Application to ensure Adherence to Medication in Chronic Non-Communicable Diseases

^[1]Dr. Ankur Joshi, ^[2]Manu Gupta, ^[3]Dr.Soumitra Sethia
^[1]Assistant professor, ^[2]Under Graduate student ^[3]Post Graduate student
^[1]Department of Community Medicine & Family Medicine,
All India Institute of Medical Sciences, Rishikesh Rishikesh,
^{[2][3]}Department of Community medicine, Gandhi Medical College,Bhopal

Abstract - Medication adherence is both vital and difficult to achieve in case of non –communicable diseases. The challenges arise because of the requirement of behavioural monitoring and continuous scrutiny of the process. This prerequisite to ensure adherence may be addressed by ICT through asynchronous communication via mobile based application. This manuscript describes the conceptual and operation framework of one of the adherence assurance application developed by the authors and investigates further the future prospects of such application.

Key words:-- Non –compliance, m-health, telemedicine, mobile-app, chronic disease,

I. INTRODUCTION

A Non Communicable Disease(NCD) by definition cannot be transmitted directly from person to person yet usually has the propensity to remain there for a longer duration. Some diseases for which there is no permanent cure (like Diabetes, Chronic Obstructive Pulmonary Disease, Hypertension) as of now, it stays for the entire life of the patient.(1) Apart from this ‘unwanted individual liability’ the absolute burden of the NCDs is also increasing in Indian population context. (2,3)The contributory risk factors behind this burden can be summarized under socio-economic –demographic transition, vulnerable ethnicity, sedentary life style, additions and changing societal norms.(4) The primary strategy (in absence of definitive cure) is to halt the progression and to prevent complication through adherence on medical advices/medication for an individual patient once the disease is diagnosed. World Health Organization (WHO) in its thematic publication states very clearly that to improve the adherence level in a population can be more rewarding comparing to improve the specific medical treatment . (5) However to deviate from a course of medication may be a natural phenomenon in real life .As several factors like unawareness about importance, competing commitments, self- laxity, side effects, polypharmacy , access to care ,duration of medication are reported to contribute in in different combination-

permutation.(6) With the context, in order to minimize the impact of these factors,it is desirable to device and institute the various strategies. Information Technology (IT) based application can play a crucial role as ‘watch-dog’, monitoring and quantification of medication. Mobile phones can be an important tool in this arena because of exponential increasing user base in India and an encouraging trend of habituation to mobile-application .((7)

II. CONCEPT –WIRE OF THE APPLICATION-

This app (Aushadh Nishtha-AN) is designed to ensure the adherence of a chronic disease patient (like Diabetes), who needs to take medicines regularly in prescribed divided dosages or a fix-drug combination for a longer duration. This app may serve as monitoring tool to ensure adherence from provider side.

Conceptually every single ‘module’ of this app is associated with the physician or the care-giver who is responsible for the prescribing/dispensing medication and under whom patient is registered. All the registered patients under a physician (or care giver) constitute a ‘monitoring cohort’ for that physician (or care giver). In every module there are two forms –registration form and adherence assurance form. Assuming at Day-0 the patient is newly diagnosed with a chronic disease and given a prescription . At this point he will be registered with AN

through a ‘registration –form’ which consists of all the generic data (name/age/sex/location/disease name/ date of diagnosis etc.) and specific pharmacological medication intervention .At this time after registration ‘modular username/password’ is shared with the patient. This basic data is merged with the unique ‘case-list’ of the physician. The next day patient log-in the AN installed on his mobile (working offline) at the time of taking first dose. He opens the ‘adherence assurance form> enters date> takes the prescribed medicine from strip and takes a snap shot >count the remaining pills>enters the QR codes/bar code of the strip and save the form and send it later (assuming no internet accessibility) or send the information (assuming internet accessibility).

The process is repeated at next day up to the next follow up visit. All the information is collected and aggregated ‘sequentially and systematically’ at physician interface At next ‘follow up visit’ or as per monitoring protocol the physician opens the central cloud server (in his laptop) through administrative username/password and receives the information and validates it .

Figure 1 showing the registration form

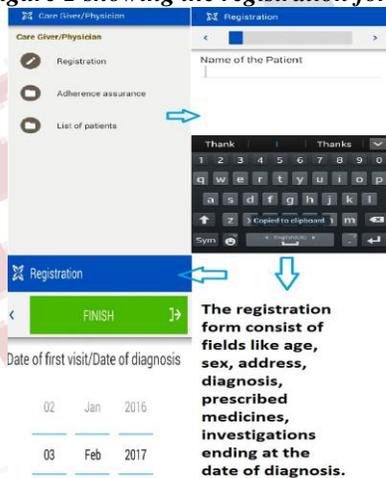
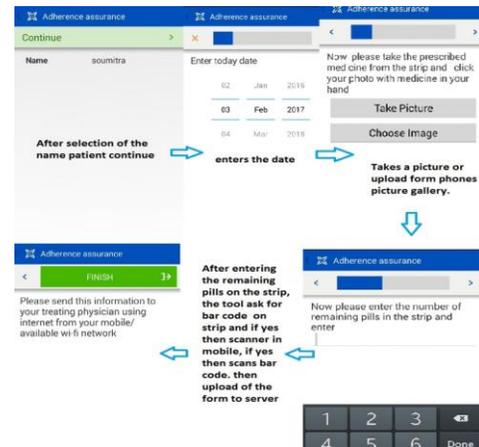


Figure 2 showing the adherence assurance form



III. RESULTS AND DISCUSSION

Result-

After this conceptual framework , we chose to build this app on Comm-care (8).CommCare is one of the open source mobile platforms intended for data collection, client management and decision support.(9) This platform has two basic interrelated division- - CommCare Mobile and CommCareHQ. The mobile application is used by the peripheral client(patients in our scenario) which also has image prompt.(8) The data submitted by peripheral clients go to a central cloud server known as CommCareHQ (8) which is available to administrator (physician or care giver in our case) for the further analysis.

A utility which is very useful in our context was the ‘case-management’ feature of this platform ((10,11). ‘Case’ is something which is needed to be track over the time (patient in our scenario). Every time the patient fills the Adherence Assurance Form(AAF) and then sends it he updates his current adherence status as well as it also links to all those AAFs sent at earlier date by him. In this process the physician can actually keep the longitudinal and updated record of the patients. ((10)

Discussion

The requirement of this app can be understood further if we consider the formal definition of adherence offered by the WHO working group which measures it in terms of concordance between behaviour of the patients and agreed recommendations.(5)Patient behaviour may be influenced or affected by a number of factors –related to self(knowledge, attitudes, beliefs, perceptions and expectations), related to medication (complexity of the medical regimen, duration of treatment, previous treatment failures, frequent changes in treatment, the immediacy of

beneficial effects, side-effects, and the availability of medical), related to system (poorly developed health services, poor medication distribution systems, lack of knowledge and training for health care providers), related to condition (severity of symptoms, level of disability rate of progression and severity of the disease, and the availability of effective treatments) and related to socio-economic status. (5,12) All these factors work in complex and non-linear manner. Some of these factors are modifiable at consumer /user end. The continuous monitoring indeed offers the latent outcome of these variables. The monitoring on continuum basis is only possible and feasible through asynchronous manner using technology.

There are contrary evidences in literature about their effectiveness in totality (13–15). While some tools are user independent (such as social robotics)(16) (17) maximum of the tools are still user dependent like ‘Aushadh –Nishtha’. As they are dependent on user they may have some logical limitations like – validation of the finding(objectivity), over/under estimation of adherence, non-automation leading to dependence on user. However, from a translational societal perspective first, they offer almost no extra burden in terms of cost on health system and second, they may let the patient and provider feel contented which is a crucial positive factor to ensure adherence.

IV. CONCLUSION-

The future of m-health tool like ‘Aushadh-Nishtha’ seems to be promising because of increasing acceptance gesture of Indian society to mobile – application. However, the most relevant issue at this juncture is to assign more objectivity to this tool. The developers through this manuscript call for the collaboration in this regards.

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