

mAID (An argusoft mRHM implementation)

Mobile phone based Health Management and Monitoring System for the Prevention of Transmission of AIDS from Mother to Child

Overview

The Prevention of Parent to Child Transmission of HIV/AIDS (PPTCT) programme was started in India in the year 2002. The program's goal is to prevent the prenatal transmission of HIV from the mother to the child which is a very preventable condition.

NACO has established numerous Integrated Counselling and Testing Centres (ICTC) in various states where pregnant women are tested and counselled. Women who are found positive are followed up through their term and appropriately treated based on the level of Infection. Once the baby is born, the field workers continue to follow up on the baby through 18 months to ascertain the HIV status of the baby.

In order to ensure prevention of transmission, the ORWs (Out Reach Workers) are required to be in periodic touch with the identified positive pregnant women. This is important not only from the point of view of treatment but also from the point of support and encouragement as the stigma and social discrimination issues against HIV positive women are also widely prevalent in today's date and time.

The **mAID** system is a mobile phone and web based application that has been designed and developed with the information and tracking needs of all the stakeholders in the system starting from the field workers (ORWs – Outreach workers), to the various levels of the management team of the program.

Current process of identification and tracking



The current process of identifying and tracking the positive pregnant women is done through a predominantly manual process. The bulk of the work, in terms of identification, tracking as well as reporting is done by the ORWs.

The ORW maintains the details of the person in paper registers and personal diaries. They then use the information to decide when they have to



contact the person regarding their next ART or for the next CD4 count and other such periodic tests and interventions. They may also have to contact the person in order get their partner or children from previous gravida tested.

This is a completely manual process. The ORW has to scan through each person's record in their register / diary to determine when such follow up dates occur. This is very time consuming, inefficient and also prone to errors.

In addition to the tracking, the ORW also has to submit regular reports to the NGO, SACS and NACO in prescribed formats. Doing these reporting activities takes time and the ORW may miss out on their core job of meeting and providing support for the positive pregnant women.

Also, the manual reports prepared by them and entered into computer systems for the purposes of reporting are only consolidated reports and do not have the details of the actual person, hence lacks tracking information.

Major Challenges



While the current processes have been in practice for some years now and are producing a certain level of result, the ORWs and other stakeholders in the system are facing various challenges on an ongoing basis. These are outlined below:

1. **Data integrity:** Since all the data is maintained in paper registers and personal diaries, the integrity and completeness of the data is often an issue. Also this becomes even more pronounced when an ORW is replaced by another and is entrusted with the task of following up with the pregnant women.
2. **Data security:** The data related to positive women is very sensitive and hence must be handled with high security. However the manual system does not provide this and becomes person dependent.
3. **Lack of proper reporting:** The ORWs / PCO spend a significant amount of time in the preparation of reports and line lists in Excel as per the prescribed formats of SACS and NACO. However, these reports are at the top level and do not have

details about the actual field level follow up activities and hence improving the 'ground situation' is difficult.

4. Miss outs: Being a manual activity, the ORWs might inadvertently miss out on a follow up for a CD4 count test or other important follow-ups. This might prove to be very significant in some cases.
5. Difficulty in Monitoring: Since the system is mostly manual in nature, it is difficult to monitor the activities of the ORWs as well as ensure readiness at the medical centers for the Test Kits, Delivery Kits and so on.

The mAID ICT system

The mAID (PPTCT – Health Management and Monitoring System) system has been developed by ArguSoft , to address all these challenges, as well as provide other significant information benefits for the PPTCT program in India.



The mAID application is a mobile application that can run on any suitable java enabled mobile phone and uses the proven SMS technology. The application provides facilities for the ORW and the PCO to capture data and provide information about all their tasks related to the PPTCT program.



As soon as an ORW identifies a positive client, they can register them in the system through the easy to use interface on the mobile phone. The data is then synchronized with the web server through mobile networks such as GPRS.

The server component of the mAID system generates appropriate 'Reminders' and sends them to the mobile phone application. As an illustration, if an ORW registers a positive pregnant women into the system, the next step of getting the women to the ART centre is generated as an 'Reminder' and sent to the mobile application. The ORW can view this reminder so that they do not miss out on this inadvertently. They can simply click on the reminder to enter the details of the event such as an ART visit or PCR test for the baby.

The application takes care of providing reminders for every positive pregnant women for the entire intervention period, which starts from the time they are identified, up to the time the baby is 18 months old.

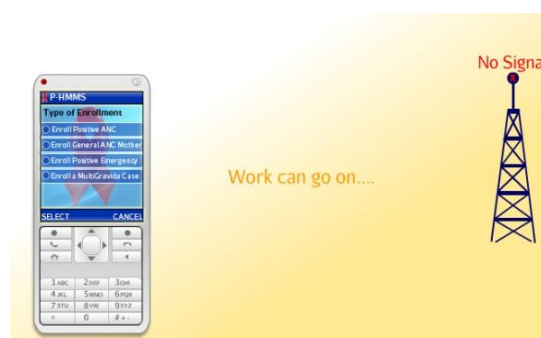


Apart from entering the details on the mobile phone the ORW is not required to submit any report as all of the reporting is automatically taken care of by the system. A supervisor or a program official can login into the mAID web application to view the current state of the program in their geographical area. This includes top level information such as the total number of HIVpositive

children born during a period, the total number of HIVpositive mothers identified and various others. They can drill down each of these reports and also see the actual person's record if required and their interaction history with their assigned ORW.

Other significant highlights of the application are

1. **Easy to use interface:** Most inputs are taken through drop down lists, checkboxes and radio buttons.
2. **High accuracy of data:** Since there is no manual recording or transcription of the data as it is directly captured on the mobile, the accuracy and authenticity of the data is significantly higher.
3. **Handles 'no network' situations:** The ORW can continue to work on her tasks and the phone stores the data locally. The data is automatically synchronized to the web server when the phone signal/tower becomes available.
4. **Push reminders:** The system automatically refreshes the list of reminders for the logged in ORW on the mobile phone
5. **Handles all functional situations:** The system provides for handling various functional scenarios such as migration of the mother from one place to another during the term of pregnancy. The reminders are reassigned to an ORW who operates in the migrated address for following up with the pregnant mother.
6. **Extensive monitoring & reporting:** The application provides both top level indicator reports for the program management as well as in depth reports for the operation and support staff from the web application interface.



Current status of the mAID rollout

The mAID application has presently been rolled out in over a dozen states in India after a successful Pilot in all the zones of Chennai district (Tamil Nadu, India).

The Pilot consisted of 35 ORWs who in turn managed 2500 patients and produced very satisfactory results. The mAID application has now been successfully rolled out in over a dozen states in India, covering 3600 mobile phones, thereby making it one of the largest mobile phone based system deployments in India



State	Districts	NGOs	ORWs	District Coordinators	Counselors
Andhra Pradesh	23	32	600	39	
Assam	3	2	19	2	
Bihar	13	5	73	10	
Chandigarh	1	1	11	1	
Chhattisgarh	5	4	26	4	
Delhi	9	1	15	2	
Goa	2	1	8	1	
Gujarat	26	1	134	16	
Himachal Pradesh	2	1	6	1	
Jharkhand	7	1	20	3	
Kerala	6	1	17	3	
Madhya Pradesh	10	2	30	4	
Maharashtra	35	35	632	37	
Manipur	9	17	102	18	18
Mizoram	8	3	35	3	
Mumbai	2	7	134	18	
Nagaland	7	7	48	7	
Odisha	10	1	50	8	
Puducherry	2	1	6	1	
Punjab	2	2	16	2	
Rajasthan	8	1	25	4	
Tamil Nadu	32	35	391	39	
Tripura	2	1	4	1	
Uttar Pradesh	13	10	64	11	
Uttarakhand	3	2	13	2	
West Bengal	11	2	45	5	
TOTAL	251	176	2,524	242	18

The production rollout has been done in over a dozen states through ART (Anti Retroviral Testing Centers). The enterprise software system is managing 3600 mobile phones/ORW, presently being used to register positive clients, follow up on the reminders generated by the system as well as monitoring by the program management, while reports are accessible through a web based interface from anywhere in the world.

The entire mAID ICT application has been designed and developed by ArguSoft , as a technology partner for the infrastructure management consultancy firm IL &FS Health Initiatives division, who are implementing this project all over India for NACO. The project is sponsored by the Global Fund from Europe.

Awards



mAID (P-HMMS) won the Manthan and the mBillionth Award in 2012 for innovative use of mobile technology in the health sector. This has been declared as one of the finest application that is tested and implemented successfully in the field. mBillionth Award is a dedicated platform to explore the latent potential of mobile and telecom sector across 8 countries in South Asia.

Decision Tree based Triaging Extension (mDOC)

As a further extension of the mRHM application, we have built a decision tree based 'preliminary diagnosis' module to facilitate the ORWs to engage the caregiver/patients to reach a triaging diagnosis by answering questions on a mobile phone through a point and click (or touch) interface. The central knowledge base of questions sequences along with the traversal logic helps them to reach the diagnosis which makes the application truly mHealth

During a consultation, a medical doctor interacts with the patient or their care giver with several questions in order to elicit their symptoms. The doctor uses the information that the patient or the care giver provides to arrive at the diagnosis and in some cases it might lead to a differential diagnosis. In such cases, the doctor usually recommends lab tests to arrive at the diagnosis. The method used by the doctor to arrive at the diagnosis is scientific and follows certain logic especially for common conditions. Almost all doctors start with very broad based questions and then follow it up with more specific questions to conclude their finding. The process of diagnosis using symptomatic information is very well proven and accurate in a very large number of known conditions.

ArguSoft has designed and developed an application module to its mHealth platform which can help a caregiver reach their diagnosis by answering questions on a mobile phone through a point and click (or touch) interface. The module uses a pre-populated list (decision tree) of questions and possible answers (provided by a panel of medical doctors). Each question lists down all possible answers and choosing any one of them shall lead the person to the next appropriate question. The interface also uses images as well as videos to help them understand the questions better and answer as accurately as possible.

This module has been recently used in one of our mHealth Projects which helps the field health workers identify common morbidities in pregnant women and in new born children. Based on the diagnosis, the system automatically classifies the status into different alert levels such as red, yellow and green for appropriate action including medications in certain cases. The system also uses the status for alerts to logistics such as calling the ambulance service. This can also be used in standalone mode as well where an individual can go thru the diagnosis, understand the severity and the appropriate actions to take depending on it.

The module connects to a central knowledge base of questions sequences along with the traversal logic to reach the diagnosis. It is capable of identifying multiple morbidities as well as offer differential diagnosis, including a "Failure to Diagnose" status . It can be integrated in any mHealth Mobile based applications and supports an easy to use web interface for populating and maintaining the decision tree.