Technology Overview of CommCare MOTECH Suite, Project Ananya

Overview

The Gates Foundation and its partners are implementing and evaluating multiple interventions in Bihar, India, to improve access and delivery of healthcare services to underserved populations. In order to support these interventions, a collaborative ICT platform is under development, led by the Grameen Foundation and Dimagi. This platform combines MOTECH and CommCare technologies to create a comprehensive solution for mobile workers providing coordinated care across the continuum of maternal and child health.

The platform includes several components:

- A mobile application which runs on an inexpensive mobile phone designed to aid Front Line Workers (FLWs). The FLW registers clients using electronic forms that have been effectively used by low-literate users throughout India. During home visits, the FLW is able to access real-time guidance through key counseling points, decision support, and simple referral algorithms. Each counseling point is reinforced by images, audio, or video clips that the FLW can use to engage their clients.
- All data is submitted in real-time (who was visited, for how long, and what answers were given) to a central server, CommCareHQ, where it is privacy-protected, backed up, and immediately made accessible to supervisors and program managers. This data is then submitted in real-time to the master server, MOTECH.
- MOTECH serves multiple functions, including forwarding reminder SMSs to the FLWs, storing all master patient information, interfacing with existing government databases, and creating an intuitive, easy way to plan and schedule events for the FLWs.
- MOTECH provides IVR outreach and courses for the FLWs who don't have access to the mobile application (because they have a more basic phone and are not part of the cohort given access to the full mobile application. This IVR system provides job aids in the form of voice messages the FLWs can play back to instruct their patient as well as a voice-based training and certification course aimed at enhancing FLW skills and knowledge.

Mobile Handset Application

The mobile handset technology supports case management across the continuum of care. Any pregnant mother or child less than one year of age can be enrolled as a 'case' in the system. Each case is tracked along a continuum of care beginning with pregnancy, through birth preparedness, delivery, the postnatal period, exclusive breastfeeding, and complementary feeding through two years of age. Devised by CARE India, the type of care due at each stage along the continuum is adapted to the case based on patient history from previous visits, decisions on future family planning and how many children are delivered.

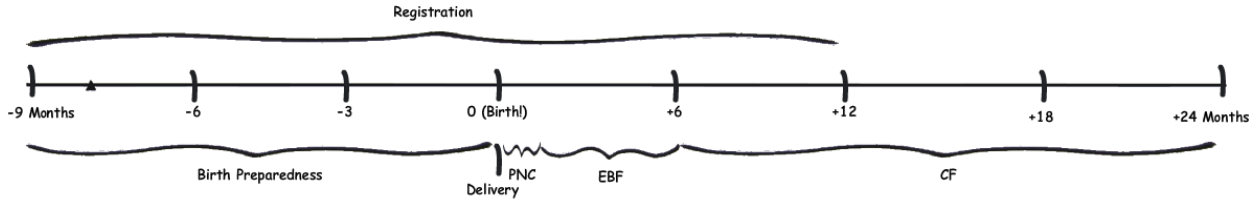

Figure 1. The Continuum of Care shows the breakdown of stages for each client. Even though patients are tracked through two years of age, registration of patients only takes place from conception through one year of age.

Checklists Designed to give the Right Message at the Right Time

The checklists designed by CARE India prompt the FLWs to counsel the beneficiary and their family and collect data at each stage in the continuum. For example, the FLW is prompted to counsel a pregnant mother about maternal dangers signs, and then collecting information about if danger signs are present, and if so, prompts the FLW to refer the beneficiary to a health facility. In each form, the text of the question is directed at the FLW to read. Audio messages can be played for low-literate users unable to read the text on the phone. The audio is currently directed at the FLW, but could be played for anyone.

There are five primary forms that go hand in hand with each stage of care:

- Birth Preparedness: Content is aimed to adequately prepare clients for delivery, including deliveries both at home and at an institution. The checklist is designed to be used multiple times prior to birth, and will remind the FLW about instances in the previous visit that require follow-up, like making sure the client has identified transportation to a nearby facility. Mother vaccinations, including TT shots, are recorded here, as well as information about pre-natal check-ups.
- Delivery: Counseling and data questions prompt the FLW to ascertain the health of the mother and children. An immunization record is kept for each child via the application, which begins with any vaccinations given at birth.
- Post Natal Care: Visits target appropriate care within the first week of birth and prompt the FLW to deliver counseling messages for appropriate care of newborns. Family planning follow up questions begin at this stage, tailored to the beneficiary based on the answers to family planning questions asked earlier in the continuum.
- Exclusive Breastfeeding: Along with prompting for any immunizations received during the first six months of a child's life and based on those already received, the checklists include counseling messages on feeding, child health, and family planning
- Complementary Feeding: Checklist questions are aimed at ensuring proper feeding and child health and recording the dates of any received immunizations.

Sharing Data between Users in a Care Team

The technology suite is designed to be used by both Anganwadi Workers (AWWs) and Accredited Social Health Activists (ASHAs One ASHA and one AWW create a team to provide care for a given physical area within a sub-center. There are 8-10 teams of FLWs to cover each sub-center, which covers a catchment area of 8,000-10,000 individuals. The same application is used by both FLWs, but a client registered or

tracked with one team member's application is shared with the other team member's application. This method should leverage the skills of either worker, enable coordination of home visits by client or care due, and allow advanced users to support less-advanced users. Furthermore, this data also synchronizes with the Auxiliary Nurse Midwife (ANM) who supervises the overall care team. The ability to synchronize cases across a care team and make them available offline is a unique capability among m-health solutions for frontline health workers. Other users could easily be configured to share the same case data.

Scheduling and Planning: Home Visit Scheduler

The technology suite is designed to help the FLW coordinate their work. Since the mobile application is designed for use both during home visits and at Village, Sanitation and Health Nutrition Days (VHSND), there are scheduling features to help with each.

During home visits, the FLW counsels the client and family based on prompts provided by the phone within each checklist. Use of the appropriate checklist is critical, and a Home Visit Scheduler is used to help the FLW know when a visit for a client is due and what type of visit it needs to be.

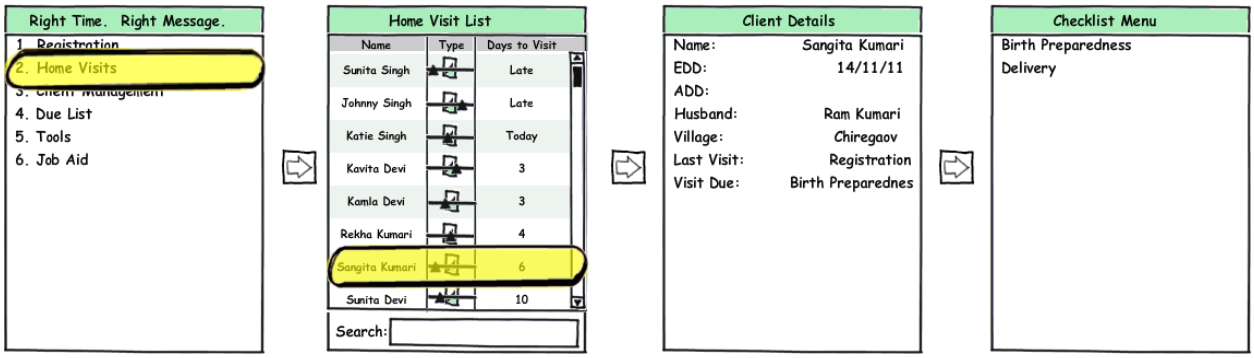

Figure 2. The Home Visit Scheduler is designed to help the FLW see which client has a visit due and what type of care should be given.

The wireframes in Figure 2 are an approximation of the screen on the phone. Beginning from the main menu, the FLW is guided to the Home Visit Scheduler, showing a list of all registered clients. The list is organized by when the next visit for each client is due. An icon (TBD) indicates at a glance whether the client is in the critical stage of delivery and post-natal care, or on either side of it. The Client Details screen provides more information about the client, in addition to showing the type of care in both the previous and upcoming visits. Lastly, the FLW is able to select which form to fill out for the client based on the continuum of care.

Scheduling and Planning: The Due List

The mobile application is also designed to be used during VHSND. VHSND is a critical period during which ante-natal care is given and immunizations distributed. VHSND has two components, mobilizing patients due for care, and dispensing care on the appropriate day.

Each FLW plans for upcoming VHSND by mobilizing applicable patients, making them aware of the appropriate date and location, as well as the type of care they are due for. The application shows a list

of upcoming events, in this case VHSND dates. The FLW can use the application to create a mobilization list, and also to update records during a VHSND.

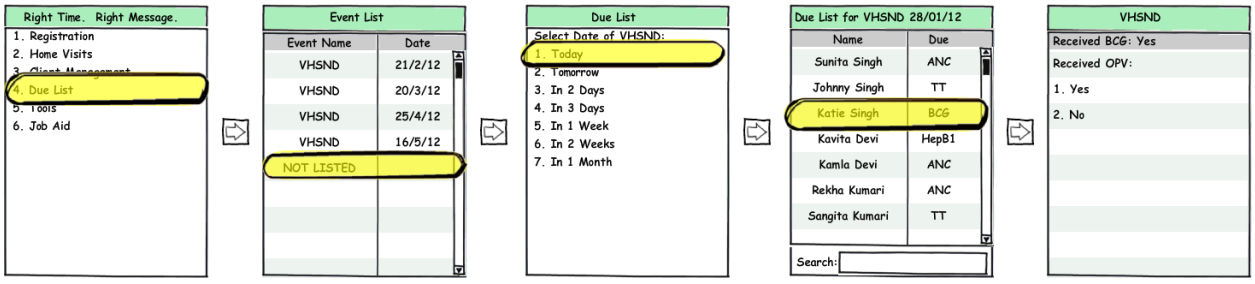

Figure 3. From the main menu, the FLW is able to see upcoming events, update events in the case of last minute changes, see a list of clients and the type of care due for each client, and update records for each client.

During VHSND, the mobile application can be used as a simple and quick method of inputting which client has received what type of vaccination or ante-natal checkup.

This use case demonstrates the power of integration between CommCare and MOTECH. MOTECH provides a web-based user interface to manage the events that populate the Event List on the mobile phone. These events can be changed or updated for each sub-center, and provide a list for the FLW to plan their work accordingly. In the case that an event is incorrect, the FLW can still use the Due list to see clients in need of mobilization or for use during VHSND by manually inputting the day of the event.

Integration of Multimedia

Multimedia is a key component of making the application effective as a tool for low-literacy users and as a means of counseling beneficiaries. In coordination with the British Broadcasting Corporation World Service Trust (BBC WST), multimedia content is being developed. Images will be embedded within the forms to associate questions with a visual prompt. Each question will also have an audio message recorded, which can be played to guide the user through the question. A library of the videos can be accessed via the phone for reference by the FLW during a home visit, or to reinforce their knowledge of content. Phones must include sufficient storage (typically on an SD Card) as well as a screen resolution appropriate for a the selected media.

Support for the FLW

In addition to the mobile phone application, there are a few key elements of the technology suite intended to provide support for the FLW. The application will provide the FLW with localized referral facility information. Embedded within checklists or available from the main menu, the FLW will be able to see up to date contact information for the nearest private emergency referral center, public emergency referral center, and emergency transportation options.

In addition, the platform can provide SMS reminders, which intend to remind the FLW of overdue tasks or essential upcoming care. An SMS will remind the FLW that a certain client is due for delivery or due for an important visit. SMS reminders will also notify the FLW of a growing list of overdue tasks. These reminders could be generated by any 3rd party system and sent through the MOTECH infrastructure to reach the target recipient. IVR reminders are also possible through the MOTECH infrastructure.

Supporting Existing Health Infrastructure

In addition to the FLW using a mobile application as a job tool, the Ananya Project aims to use mobile technologies to reinforce the existing health infrastructure. The mobile applications designed for the Auxiliary Nurse Midwives and Block Health Managers have one primary component; to easily view information about how the workers they supervise are performing via quantitative, up to date information.

The ANM will meet periodically with each FLW, and will be able to access performance data such as how many visits were performed, how many visits were performed on time, and which clients require more follow-up. Furthermore, basic case information will be shared between the FLWs and the ANM supervising them so that the ANM can look at patient records of interest, like upcoming deliveries or patients with complications. Additionally, the ANM will get an SMS message periodically identifying high and low performing FLWs.

The BHM application, similar to the ANM application, will display basic quantitative information about how each of the ANMs is performing in their respective sub-centers, such as the percentage of on time visits for the entire sub-center. They will also receive an SMS periodically to relate performance of the ANMs under supervision and reinforce the content of the mobile application.

Interactive Voice Response to support Frontline Workers and Clients

For FLWs with access to it, the mobile application provides the benefits listed in the sections above. FLWs who do not have the mobile application (because they are not part of the mobile application deployment districts) will access training and on-the-job aids via an interactive voice response service which is available on any phone. Similarly, patients (who will not have access to the mobile application and my not have the literacy skills to navigate written information) will receive interactive voice messages encouraging them to pursue health-seeking behaviors.

FLW Education and Certification

All FLWs will be encouraged to complete a training course access via interactive voice response. The course is a series of lessons and quizzes designed to improve the knowledge and skills needed to perform their work. On their own schedule, the FLWs call in to hear lessons. At the end of each call, their progress is recorded; on their next call, the training picks up at the point they left off. When they complete the entire course, they are issued a printed certificate which they can use to document their training and bolster their credibility. This certificate promises to be a significant incentive for FLWs.

FLW Job Aids

While meeting face-to-face with clients, those FLWs who do not have access to the mobile application can access job aids to improve their interaction with clients. By calling into a mobile short code, the FLW can access interactive voice response job aids that will instruct them on the steps to take in a particular appointment. This content can include questions to ask the client to assist diagnosis, instructions for treatment of a particular condition, or advice for the patient. Much of the job aid content is designed to be played over the speakerphone so the patient can hear the content themselves. The expectation is

that this content will assist the FLW in delivering better care and will be perceived as more authoritative – and therefore more likely to be followed – by the clients

Client Behavior Change Communication

The Ananya project also includes a service targeted directly at client patients. This service, branded Kilkari, delivers voice messages to pregnant women and their families who are registered in the program. These messages are delivered weekly for the duration of the pregnancy and first two years of the child's life and contain suggestions for promoting greater health for the mother and child, including reminders of recommended antenatal appointments, information about warning signs, tips for pregnancy planning, and vaccine reminders. These messages can be accessed from any phone and are delivered in local language via IVR, so they are accessible regardless of the literacy level or mobile phone ownership status of the client.

Server Capabilities

Integration of the CommCareHQ and MOTECH servers provides a powerful backend to the mobile handset:

- Master Patient Data: CommCareHQ will pass all case and visit data collected from the phones to MOTECH to create a repository of master patient information and case history.
- SMS engine: MOTECH will be able to create message content based on the patient data stored on its server, or forward messages created from the CommCareHQ server.
- Event Creation: MOTECH will provide the user interface to web users to create and update events for the FLWs. For the Ananya Project, the primary use case for this is VHSND, but can easily be adapted for numerous applications.
- Integration with External Databases. As the repository of master patient information, MOTECH is able to integrate with external databases, such as the Mother Child Tracking System (MCTS) or DHIS health databases for the government of India.

A Powerful and Effective Platform

The combination of CommCare and MOTECH forms a circle of care that trains FLWs, coordinates their activities with one another, and closes the loop between advice given to clients and the actions those clients take. The system accommodates a range of FLW and client skills, providing services that scale to meet the technological and literacy capacity of each participant. Combined with a committed field organization and motivated FLWs, the Ananya technical platform will deliver measurable improvements to health outcomes across the state of Bihar.