Large-scale mHealth professional support for health workers in rural Maharashtra, India

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Abstract

Expanding mobile telephony in India has prompted interest in the potential of mobile-telephone health (mHealth) in linking health workers in rural areas with specialist medical advice and other professional services. In 2012, a toll-free helpline offering specialist medical advice to community-based health workers throughout Maharashtra was launched. Calls are handled via a 24 h centre in Pune, staffed by health advisory officers and medical specialists. Health advisory officers handle general queries, which include medical advice via validated algorithms; blood on-call services; grievance issues; and mental health support – the latter calls are transferred to a qualified counsellor. Calls requiring more specialist advice are transferred to the appropriate medical specialist. This paper describes the experience of the first 4 years of this helpline, in terms of the services used, callers, nature of calls, types of queries serviced and lessons learnt. In the first 4 years of the helpline, 669,265 calls were serviced. Of these calls, 453,373 (67.74%) needed medical advice and were handled by health advisory officers. Specialist services were required to address 199,226 (29.77%) calls. Blood-bank-related services accounted for 7,919 (1.18%) calls, while 2,462 (0.37%) were grievance calls. Counselling for mental health issues accounted for 6,285 (0.94%) calls. The large-scale mHealth professional support provided by this helpline in Maharashtra has reached many health workers serving rural communities. Future work is required to explore ways to expand the reach of the helpline further and to measure its effectiveness in improving health outcomes.

Keywords: call centre, health advisory support, health information, India, mHealth

Background

India is a large country with vast disparities between the urban and rural areas, in both the distribution of health resources and health-care outcomes. In 2011, of the 1.4 million medical practitioners in India, 74% lived in urban areas serving about 30% of the population, while the remaining 26% served the 70% of the population residing in rural areas.¹ The deficiency in specialists in various states has been well documented.²⁻⁴ Overall, for the rural public health-care system in 2012, the average shortfall of specialists was 77.2% in the Empowered Action Group (EAG) states, 56.1% in the non-EAG states, and 69.7% in India overall.⁵ This disparity in health resources contributes to skewed health outcomes and health services coverage.⁶⁻⁷ For example, for 2016, the estimated infant mortality rate in urban India was 23.0 per 1000 live births compared to 38.0 per 1000 live births in rural India. Similarly, the crude death rate was 5.4 per 1000 population in urban India compared to 6.9 per 1000 population in rural India during the same time period.⁸

Measures to address the shortage of skilled health workers in rural India include monetary compensation, workforce management, education and continuous professional development, and alternative service providers. Considerable success has also been achieved with education-related innovations and the community health worker programme.¹ Community health workers are central to primary health-care service delivery in rural India but often lack support in handling complicated cases in the field, requiring consultation and opinions from specialist doctors. Similarly, medical officers working in remote areas may also need specialist advice at times.

Expanding mobile telephony and low-cost internet services in India has enabled easy people-to-people communication and information exchange.⁹ Tapping into the combined potential of mobile technology and health communication, widely known as electronic health (eHealth), can play a significant role in linking health workers in underserved areas with specialist medical advice and other professional services. The World Health Organization defines eHealth as "the cost-effective and secure use of information and communications technologies in support of health and health-related fields, including health-care services, health surveillance, health literature, and health education, knowledge and research".¹⁰ Specifically, the rapid spread of mobile technologies, as well as advances in their innovative application to address health priorities, has evolved
into a new field of eHealth, known as mHealth.\textsuperscript{11} The Global Observatory for eHealth has defined mHealth, or mobile health, as “medical and public health practice supported by mobile devices, such as mobile phones, patient monitoring devices, personal digital assistants, and other wireless devices”.\textsuperscript{12} mHealth involves the use and capitalization of a mobile phone’s core utility of voice and short messaging services. It also utilizes more complex functionalities and applications, including general packet radio service, third- and fourth-generation mobile telecommunications (3G and 4G systems), global positioning systems and Bluetooth technology.\textsuperscript{12}

Among health workers in low- and middle-income countries, mHealth interventions have shown improved communication, better access to health-care information and increased likelihood of receiving specialist advice.\textsuperscript{13–15} Although the use of mHealth shows promise, findings from the Global Observatory for eHealth survey in 2011 highlighted that most mHealth initiatives were only small-scale pilot projects, mainly addressing single issues in information sharing and access; there were few examples of large-scale mHealth implementations.\textsuperscript{13} This paper reports the preliminary findings from the first 4 years of a large-scale mHealth intervention supporting rural health workers throughout the state of Maharashtra in India.

The initiative arose because the Government of Maharashtra identified a need to support its existing health-care professionals while they are working in the field. Pioneered and initiated by Piramal Swasthya Management and Research Institute, in collaboration with the state government and the National Rural Health Mission, Maharashtra, a technology-based platform known as the Health Information Helpline was launched in 2012 at Pune, Maharashtra. The helpline offers specialist medical advice to community-based health workers. This paper describes the services, with special emphasis on the callers, the nature of calls, and the types of queries serviced from the time of inception up to December 2015.

The National Health Mission, Government of Maharashtra and Naithika Independent Ethics Committee approved the study (registration number: ECR/42/Indt/AP/2013).

Setting

The state of Maharashtra is located in the west-central part of India, along the coastline of the Arabian Sea. It is the second largest state in India in terms of population (112 million) and the third largest state by area (0.308 million km\textsuperscript{2}). The population of the state contributes 9.3% of the total population of India.\textsuperscript{16} Over the decade 2001–2011, the state recorded a population growth rate (16%) that was marginally lower than the national average (17.7%).\textsuperscript{17} The state has a population density of 365 per km\textsuperscript{2} and is among the highly urbanized Indian states, with 45.2% of the total population residing in urban areas.\textsuperscript{17} It is one of the wealthiest and most developed states in India, contributing 25% of India’s industrial output and over 20% of the country’s gross domestic product.\textsuperscript{16} In the National Family Health Survey 4 (2015–2016), the sex ratio at birth (924 females per 1000 males) and literacy rate (83%) were well above the national average of 919 females per 1000 males and 74% respectively.\textsuperscript{18} In terms of health indicators, the state has a better infant mortality rate (IMR; 19 per 1000 live births) and maternal mortality ratio (MMR; 68 per 100 000 live births) when compared to India as a whole (IMR: 34 per 1000 live births; MMR: 167 per 100 000 live births).\textsuperscript{8}

The public health-care system in Maharashtra and in India

India has a mixed health-care system; Maharashtra is no different. It comprises both public and private health-care service providers. However, most of the private health-care providers are concentrated in urban India, providing secondary and tertiary care services. The public health-care infrastructure in rural areas has been developed as a three-tier system based on the population norms, and is described next.\textsuperscript{19}

Subcentres

A subcentre is the most peripheral and first contact point between the primary health-care system and the community, and is established in plain areas with a population of 5000 people and in hilly/difficult-to-reach/tribal areas with a population of 3000. Each subcentre is staffed by one auxiliary nurse midwife (ANM)/female health worker and one male health worker. The subcentres are assigned tasks in order to bring about behavioural change in the community and to provide services in relation to maternal and child health, family welfare, nutrition, immunization, diarrhoea control and control of communicable diseases.

Primary health centres

A primary health centre is established in plain areas with a population of 30 000 people and in hilly/difficult-to-reach/tribal areas with a population of 20 000, and is the first contact point between the village community and the medical officer. The primary health centres were envisaged to provide integrated curative and preventive health care to the rural population, with emphasis on the preventive and promotive aspects of health care. Primary health centres are established and maintained by the state governments. As per minimum requirement, a primary health centre is to be staffed by a medical officer supported by 14 paramedical and other staff. Under the National Rural Health Mission, there is also a provision for an additional ANM, depending on local needs. The primary health centre acts as a referral unit for 5–6 subcentres and has 4–6 beds for inpatients.

Community health centres

Community health centres are established and maintained by the state government in areas with a population of 120 000 people and in hilly/difficult-to-reach/tribal areas with a population of 80 000. As per minimum norms, a community health centre is required to be staffed by four medical specialists, namely a surgeon, a physician, an obstetrician gynaecologist and a paediatrician, supported by 21 paramedical and other staff. It has 30 beds and serves as a referral centre for primary health centres within the block and also provides facilities for obstetric care and specialist consultations.

In addition to the above, under the National Rural Health Mission, every village has a minimum of one accredited social health activist (ASHA). These are village-level incentivized health functionaries, whose role is to act as the link between the community and the health system. An ASHA is now an integral part of India’s public health-care system, in the form of a health catalyst.\textsuperscript{20}
Components and functioning of the call centre

Health workers eligible to use the helpline

The population eligible to use the helpline comprises ASHAs, ANMs, health assistants (male and female), multipurpose health workers (male and female), pharmacists and laboratory technicians, as well as medical officers working in public health facilities.

At the time the helpline service was launched, in the public health-care sector in the state of Maharashtra, there was a total of 96,431 health professionals, of whom 58,508 (60.70%) were ASHAs, 12,627 (13.10%) were ANMs (including the additional auxiliary nurse midwives), 3,709 (3.84%) were medical officers, 7,284 (7.56%) were health assistants, 10,780 (11.18%) were multipurpose health workers, 2,238 (2.32%) were pharmacists and 1,285 (1.33%) were laboratory technicians. Although published data are not available regarding the availability and use of mobile phones among the health-care professionals in Maharashtra, the Government of Maharashtra communicates many key messages to the health-care professionals via mobile phone.

The set-up and staffing pattern

The service is made available through a toll-free phone call to a three-digit number (104) from any landline or mobile phone. The set-up comprises a 22-seat capacity call centre that is functional 24×7 throughout the year. The staff comprise health advisory officers (34), service improvement officers (16), gynaecologists (5), paediatricians (3), a general physician (1), a general surgeon (1), a public health specialist (1), counsellors (5) and supervisors and administrative officers (6). Specialist doctors include gynaecologists, paediatricians, a general physician, a general surgeon and a public health specialist. Twenty-two paramedical staff and specialist doctors, namely a gynaecologist and a paediatrician, work in rotational shifts. There are three shifts, 07:00 to 14:00; 14:00 to 21:00 and 21:00 to 07:00. Depending on call volumes, the numbers of staff are adjusted for the night services. Calls for a gynaecologist or paediatrician are handled 24×7, as these professionals work in three shifts. Most of the calls for specialists directed towards the general physician, general surgeon and public health specialist are during the daytime and hence these specialists’ working hours are from 09:00 to 18:00. If a caller wants to speak to a physician, general surgeon or public health specialist in their absence, and if the call is for an emergency, then the call is connected to the respective specialist, through a conference call (any time of the day). If such a call is a non-emergency, then it is handled by the gynaecologist/paediatrician on duty. If they are unable to address the query, the caller is asked to call back the next day.

The services are provided in three languages, namely Marathi, English and Hindi. Specifically designed algorithms and theme-based documents are used as tools to deliver these services. Information on government-run schemes and facilities is also available and updated periodically.

An algorithm consists of an orderly sequence of steps, with each step depending on the outcome of the previous one. Based on this step-by-step sequence, the queries posed by callers are answered. This step-by-step sequence helps to provide comprehensive information regarding a disease, or in clarifying any other health-related query, to the caller. Theme-based documents are used while dealing with mental health issues. The algorithms and theme-based documents were specifically developed for the service and were validated both internally and externally by expert doctors from different medical institutions and hospitals appointed by the Government of Maharashtra.

The process involved

When a patient approaches a health worker or a medical officer, the required care is offered by the relevant health professional. However, if the health professional requires further guidance or some clarification, he or she can call 104 from any mobile phone or landline in Maharashtra. The call is attended to by a health advisory officer at the call centre. The trained health advisory officer registers the call by asking a set of preliminary questions about the caller and the query (see Box 1). After this set of preliminary questions, a unique beneficiary identification number is generated. Depending on the caller type, medical officers’ and specialists’ calls are directly transferred to the specialist requested and the calls from ASHAs and ANMs are then handled by the health advisory officer. The officer probes the query to identify the correct algorithm. Once the algorithm is identified, there are three possible scenarios:

Scenario 1: general query

A health advisory officer handles general queries himself or herself. He or she uses the algorithms to resolve the query and closes the call. A general query can be of the following types:

- **medical advice:** the health professional calling requires advice pertaining to a particular medical condition; validated algorithms are used to provide the medical advice;
- **blood on-call services:** callers may request information regarding blood or a specific blood group. The details are registered and shared with the blood banks affiliated with this process. The caller is informed about the availability as well as about non-availability of the blood. In addition, after 4 h of noting their requirement, a call is made to the caller to cross-check whether his or her request has been taken care of;
- **mental health issues:** in some cases, health workers call specifically about issues related to the mental health of their patients. This is given special care and transferred to a counsellor (MA in psychology), who then uses theme-based documents to counsel the patient directly.

**Box 1. Initial set of questions for classifying patients**

- General questions: age, sex, phone number, taluk, village, district
- Caller type: whether the call is from an ASHA, ANM, medical officer or specialist
- Unit type: whether the call is from a subcentre, primary health centre or community health centre
- Repeat call: whether the caller has called 104 before, for the same condition
grievance calls: a health worker may sometimes call to complain regarding the absence of certain drugs in medical kits, or in the health centre, or regarding health infrastructure issues in the primary health centre or the subcentre, or regarding delay in their payments, receipt of benefits, etc. All such grievances are addressed using an “escalation matrix”, whereby appropriate higher authorities are informed regarding the issue. If the problem is resolved within a certain period of time, the caller is informed. If the problem is not resolved, the next higher authority is informed about the problem for resolution. The escalation thus continues until the problem is resolved.

Scenario 2: specialist advice
A caller requiring a specialist consultation is transferred to the respective specialist doctor, who then attends to the call, interacts with the health worker, listens to his/her query, offers advice and finally closes the call.

Scenario 3: emergency response
If emergency medical services are needed, the caller is requested to call the 108 emergency service, since the two services are not yet interconnected.

A call that is attended to and completed by the health advisory officer or one of the specialists at the Health Information Helpline is called a serviced call.

Recruitment and training of call centre staff
The recruitment process is stringent and the traits of a successful call taker are observed before selecting candidates. In order to be eligible, candidates applying for the post of health advisory officer must have completed either Bachelor of Pharmacy or Bachelor of Ayurveda, Medicine or Surgery, or be a life sciences graduate. He or she must be proficient in all three languages, namely, Marathi, English and Hindi. After selection, they undergo a 10-day training programme focusing on technical aspects, algorithms, communication skills, language skills, probing skills, data-entry skills and professional customer care service skills, including call handling, call disposition, reporting, quality assurance and monitoring. Quarterly training programmes are conducted to ensure service quality. In addition, monthly review sessions are conducted, followed by short training sessions focusing on individual shortcomings. The performance of staff is continuously assessed by a transaction monitoring process, to generate a quality score based on their communication skills; data-entry skills; and ability to interpret needs and articulate the best responses, to deliver rebuttal if a caller creates a nuisance, and to mirror the caller’s style.

Development, user feedback and promotion of the service

Content testing
System design began after the success of a programme that Piramal Swasthya Management and Research Institute established and implemented in partnership with the Government of Andhra Pradesh during 2007 and 2012. This service was available for the general public and received over 53 million calls during this period. The experience of establishing the service in Andhra Pradesh was used to develop the Maharashtra service but with the addition of new algorithms and disease summaries, since the intended end-users were health-care professionals rather than the general public. The new algorithms and disease summaries were developed and then validated by experts in the specialty, by the Government of Maharashtra. These are updated regularly, each year.

User feedback
Customer satisfaction is assessed via a feedback survey using a “Customer Delight Index”. The service user is contacted by staff members dedicated for this purpose (outside of the regular staff – a different department altogether) to get their feedback regarding their experience with the service, in terms of user satisfaction, utility and quality of service, and the call is rated on a scale of 0–5. The following questions are used for the feedback survey:

- was the service provider empathetic and polite throughout the call?
- did you feel the agent understood and handled your health concern appropriately?
- did the advice give you relief for your problem?
- will you use the services of 104 again?
- would you like to refer the 104 service to your relatives, friends and others?
- which facility would you have visited if 104 was not available?
- how much money would you have spent approximately for your problem if you had availed the services of a doctor?
- what was your overall experience when you last called 104?

Access of individual participants
Initially there was a challenge for health-care professionals, many of whom felt that calling up an invisible stranger and trusting that stranger was a barrier. However, this barrier has slowly been overcome. As the specialists provided by the service have mostly remained the same, they have been able to develop a rapport with the health-care professionals using the service and an element of trust has developed over time. More and more health-care professionals have started calling the helpline. News has spread by word of mouth and perceptions regarding the service have changed. In addition, the Government of Maharashtra has carried out information, education and communication activities within the government hospitals, spreading the word about the services.

Another challenge is that of long waiting periods. The call reaches the service provider and is then transferred to the server, where it is allotted according to the availability of a registration officer. Sometimes, if there is a long wait, the caller disconnects the call. For such cases, a system of making outbound calls to these callers has been developed, to provide the required service. However, some of these callers may be lost, owing to connectivity issues or failure to pick up the call.

Service promotion
Promotion of the service is carried out in many ways:

- display boards with information about the service are put up in all government health facilities in Maharashtra;
- information regarding this service is provided in all monthly review meetings with health-care professionals;
• advertisements are regularly given out on radio and in newspapers.

Data extraction and analysis

A secure web-based application is used to capture real-time data. Once calls are received, three kinds of data are captured. First, demographic data are collected as part of the electronic medical record. Then there are data pertaining to the algorithms and theme-based documents that are used to deliver the necessary advice. These form the primary data, which have been used for the purpose of this article. The voice recordings are secondary data. All call data are stored on the main server and a scheduler is run to upload these data daily onto the reporting server, central reporting or dashboard server, as well as an external back-up disk. Voice recordings are not used for any kind of data analyses, but are used only for quality checks, as per the government regulations.

In order to extract the data into Excel, an authorized administrator is logged in to the central reporting application. The application then executes preset Structured Query Language queries based on the data model, to generate Excel reports.

Observations made on calls and callers

During the first 4 years of its activity from January 2012 to December 2015, the helpline received a total of 839 108 calls, of which 669 265 (79.76%) were serviced calls. Disconnected calls (101 336, 12.08%), calls with noise disturbances that were terminated (7573, 0.90%), nuisance calls (30 999, 3.69%), and silent or wrong calls (29 935, 3.57%) contributed to the remaining unserviced calls. Since a serviced call is one that is attended to and completed by an official at the call centre, detailed information regarding the profile of the calls is available only for the serviced calls. Hence, this paper will focus only on those calls (n = 669 265).

Table 1 gives a breakdown of the serviced calls (100%). Of the total number of serviced calls, 453 373 (67.74%) needed medical advice and were handled by non-specialists (health assistants and 35.67% of the calls made by multipurpose workers were made to seek non-specialist medical advice, while 44.32% of the calls made by ANMs were made to seek specialist medical advice. A little less than half the calls by medical officers were made to seek specialist medical advice. Similarly, 54.43% of the calls made by ANMs were made to seek non-specialist medical advice, while 44.32% of the calls made by multipurpose workers were made to seek specialist medical advice. A little less than half the calls by medical officers were made to seek specialist medical advice. More than one third of the calls made by pharmacists were made to seek advice from a specialist (64.38%) and these calls were mostly related to prescriptions and drug dosages.

Table 3 presents the distribution of the study population and the type of specialist service they sought. Of the 199 226 calls that were handled by a specialist at the call centre, most required the service of a gynaecologist (48.08%), followed by a general physician (27.34%), a paediatrician (10.69%), a general surgeon (7.44%) or a public health specialist (6.44%). Of all those who sought specialist service, more than half were ASHAs (52.70%), followed by ANMs (36.23%).

Table 1. Breakdown of the serviced calls handled by the call centre, n = 669 265

<table>
<thead>
<tr>
<th>Type of call</th>
<th>Number (%) of calls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-specialist medical advice</td>
<td>453 373 (67.74)</td>
</tr>
<tr>
<td>Specialist medical advice</td>
<td>199 226 (29.77)</td>
</tr>
<tr>
<td>Grievance</td>
<td>2462 (0.37)</td>
</tr>
<tr>
<td>Calls pertaining to blood-bank-related services</td>
<td>7919 (1.18)</td>
</tr>
<tr>
<td>Calls seeking counselling for mental health issues</td>
<td>6285 (0.94)</td>
</tr>
<tr>
<td>Total number of service-provided calls</td>
<td>669 265 (100)</td>
</tr>
</tbody>
</table>

Table 2. Distribution of calls by the study population and type of service sought

<table>
<thead>
<tr>
<th>Type of caller</th>
<th>Medical advice: non-specialist</th>
<th>Medical advice: specialist</th>
<th>Grievance calls</th>
<th>Blood bank services</th>
<th>Mental health counselling</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accredited social health activist</td>
<td>337 707 (74.58)</td>
<td>105 001 (23.19)</td>
<td>1377 (0.30)</td>
<td>3180 (0.70)</td>
<td>5566 (1.23)</td>
<td>452 831 (67.66)</td>
</tr>
<tr>
<td>Auxiliary nurse midwife*</td>
<td>64 177 (54.43)</td>
<td>52 260 (44.32)</td>
<td>286 (0.24)</td>
<td>812 (0.69)</td>
<td>376 (0.32)</td>
<td>117 911 (17.62)</td>
</tr>
<tr>
<td>Medical officer</td>
<td>27 878 (45.82)</td>
<td>28 949 (47.74)</td>
<td>653 (1.08)</td>
<td>3132 (5.16)</td>
<td>119 (0.20)</td>
<td>60 640 (9.06)</td>
</tr>
<tr>
<td>Health assistant (male or female)*</td>
<td>10 554 (64.38)</td>
<td>5509 (33.60)</td>
<td>73 (0.45)</td>
<td>149 (0.91)</td>
<td>109 (0.66)</td>
<td>16 394 (2.45)</td>
</tr>
<tr>
<td>Multipurpose worker (male or female)*</td>
<td>10 169 (62.66)</td>
<td>5790 (35.67)</td>
<td>38 (0.23)</td>
<td>142 (0.87)</td>
<td>91 (0.56)</td>
<td>16 230 (2.43)</td>
</tr>
<tr>
<td>Pharmacist</td>
<td>2244 (59.27)</td>
<td>1454 (38.40)</td>
<td>29 (0.77)</td>
<td>37 (0.98)</td>
<td>22 (0.58)</td>
<td>3786 (0.57)</td>
</tr>
<tr>
<td>Laboratory technician</td>
<td>735 (49.90)</td>
<td>263 (17.85)</td>
<td>6 (0.41)</td>
<td>467 (31.70)</td>
<td>2 (0.14)</td>
<td>1473 (0.22)</td>
</tr>
<tr>
<td>Total</td>
<td>453 373 (67.74)</td>
<td>199 226 (29.77)</td>
<td>2462 (0.37)</td>
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<td>6285 (0.94)</td>
<td>669 265 (100)</td>
</tr>
</tbody>
</table>

* Auxiliary nurse midwives and additional auxiliary nurse midwives, male and female multipurpose workers, and male and female health assistants have been grouped together.
Lessons learnt

The Health Information Helpline offering specialist medical advice to community-based health workers in rural Maharashtra is one of the largest mHealth initiatives in India to date. Over a period of 48 months, the helpline serviced a total of 669,265 calls. It is important that community health workers, who form an important part of health-care delivery in India, are adequately supported by the government. This large-scale Health Information Helpline was set up to provide professional support to health workers and empower them in providing effective and high-quality health care to the population they serve.

There is a lack of published data on the availability of infrastructure to support technology operations in the study location. However, the government itself shared a database of contact numbers of all ASHAs, ANMs and medical officers working in the state of Maharashtra. The authors therefore believe that all these health professionals either possess or have access to mobile phones to utilize the service line whenever necessary. However, inclusion of a few additional questions is being considered; these would be used after the queries of the caller are answered satisfactorily, and would pertain to the professionals’ ownership of mobile phones, data connectivity and availability of technical support in their locations, to understand their challenges at the field level. A study conducted in Karnataka on the role of mobile phones in female health workers’ work routine, revealed that 100% of calls were given a call back; 3.57% were silent or wrong calls. The remaining 20.24% of calls could not be serviced, since they were either silent or wrong calls, or nuisance calls, or calls with noises and disturbances or that got disconnected midway during the interactions. Disconnected calls were given a call back; 3.57% were silent or wrong calls. Probable reasons are that the caller dialled a wrong helpline number, or that they were silent as they were not yet ready to talk about their concerns or felt shy or apprehensive about discussing their health concerns over the telephone. Silent calls can also be attributed to network-related issues. Nuisance calls accounted for 3.69% of calls; many of these may be attributed to the fact that the 104 number is toll-free. Targeted advertising might help in reducing this to some extent, but it is probable that nuisance calls can neither be eliminated nor reduced significantly. It is important to simply be aware that about 4% of calls will be nuisance calls. Over a period of 4 years, 839,108 calls from 96,431 health-care professionals resulted in an average of 2.18 calls per person per year. This is a relatively low number and there is scope for improvement in the number of calls received.

On a daily basis, the helpline makes about 300 outbound calls to ASHAs and ANMs in the state, using the database shared by the government, to promote the call centre and explain the available services and new government incentives and schemes. One round of calls to all the ASHAs and ANMs in the state is completed in about 6 months, and the process is then repeated.

It was observed that the maximum number of calls was made by ASHAs, followed by ANMs and medical officers. This is as expected, as there are more ASHAs than the other two cadres. Most calls that sought specialist medical advice sought the advice of a gynaecologist (48.08%) or a paediatrician (10.69%). This is probably due to the fact that most ASHAs are trained in, and receive performance-based incentives for, promoting universal immunization, referral and escort services for reproductive and child health and other health-care programmes in the community. ASHAs are usually the first contact for any health-related demands of underserved sections of the population, especially women and children, who might have difficulty in accessing health services.

Only a small proportion of the calls resulted in counselling for patients with issues related to mental health (0.94%). As the service is mainly utilized by health workers in the community and not by the patients themselves, most of the queries and support needed are for medical advice. Most community health workers are not trained in identifying issues related to mental health, indicating that there is scope for improvement; with training on aspects of mental health and increasing awareness about the availability of counselling services, the utilization might be higher.

The authors’ experience in Maharashtra provides preliminary data demonstrating that mHealth is an easily accessible professional support system for community health workers. A recent systematic review suggests that mHealth interventions directed at health workers in low-resource settings has the potential for widespread health system improvements using technology. Another review by Braun and colleagues provides evidence that mobile technology offers promising opportunities to improve the range and quality of services provided by community health workers.
Future directions

To the best of the authors' knowledge, no other study from India has explored these aspects of mHealth among community health workers. There is some literature that suggests that mHealth interventions are acceptable among patients for receiving health information and supporting health care in the rural Indian context. However, further research into the acceptability and usability of this service at the community level among patients and health workers needs to be undertaken. Surveys on the health outcomes due to this intervention, cost effectiveness and patient satisfaction are necessary to understand the effectiveness of this helpline. In addition, efforts towards understanding the utility of the helpline in improving health workers’ knowledge, practice, motivation and work efficiency need to be explored in more detail.

Conclusion

The large-scale mHealth professional support provided by this helpline has reached a large number of health workers in the community in rural Maharashtra. Future work is required to explore ways to reach a greater number of health workers and to measure the effectiveness of the helpline in improving health outcomes.

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