



Increasing use of health services in remote areas using mobile technology-SMART Approach

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Agenda

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Approach

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Acronyms

EDSS : Electronic decision support systems

CMD : Common mental disorders

GAD7 :Generalized Anxiety Disorder questionnaire

mhGAP-IG : Mental Health Gap – intervention Guide

PHQ9: Patient Health Questionnaire

ASHAs :Accredited Social Health Activists

SMART :Systematic Medical Appraisal Referral and Treatment

Background

- ❖ Research shows that many people suffer from mental disorders but only 15-25% of them receive any mental health care in India.
- ❖ Stigma, lack of adequate mental health services and absence of trained mental health professionals are some of the reasons for this gap in treatment, which is even worse in Scheduled Tribe areas compared to non-Scheduled Tribe areas of rural India.
- ❖ This project aimed to use task shifting and mobile-technology based electronic decision support systems to enhance the ability of primary care health workers to provide evidence based mental health care for stress, depression and suicidal risk in 30 remote Scheduled Tribe villages in West Godavari District of the state of Andhra Pradesh, India.

Methods

- ❖ The study conducted over 2 years, trained lay village health workers and primary care doctors to screen, diagnose and manage individuals with stress, depression and suicidal risk using algorithm based mobile applications that facilitated mental health services use.
- ❖ A pre-post evaluation using mixed methods assessed the change in mental health services by those screened positive, and this presentation reports on the quantitative aspects of that evaluation.



Study objectives

The study used a pre-post design and had two key objectives:

- 1. Development of a multifaceted intervention**
- 2. Demonstrating feasibility, acceptability and preliminary impact of the intervention**

The primary outcome of the study was to assess the change in proportion of mental health services use by individuals who were suffering from Common mental health disorders (CMD). Other quantitative outcomes included changes in depression and anxiety scores between pre- and post-intervention. Qualitative interviews were conducted at post-intervention

Study Design

- ❖ Study duration: 24 months
- ❖ Study population: The study involved all eligible adults ≥ 18 years of age who gave consent to participation, were able to understand the questions and instructions, and were not limited by any severe physical disorder from accessing mental health services.

Development of the multifaceted intervention

Development of mobile technology based EDSS:

- A single screening and management algorithm was developed for use by the doctors and ASHAs.
- The screening tool used by ASHAs was based on standard screening tools – Patient Health Questionnaire (PHQ9) and Generalized Anxiety Disorder questionnaire (GAD7).
- The diagnosis and management guidelines used by the doctors was based on Mental Health Gap – intervention Guide (mhGAP-IG).
- The system was developed on an OpenMRS platform and allowed clinical data to be shared between the ASHA and doctor using cloud computing.

PHQ9 and GAD7 Questionnaire

PATIENT HEALTH QUESTIONNAIRE - 9				
Over the last 2 weeks, how often have you been bothered by any of the following problems?	Not at all	Several days	More than half the days	Nearly every day
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed, or hopeless	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Poor appetite or overeating	0	1	2	3
6. Feeling bad about yourself — or that you are a failure or have let yourself or your family down	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed? Or the opposite — being so fidgety or restless that you have been moving around a lot more than usual	0	1	2	3
9. Thoughts that you would be better off dead or of hurting yourself in some way	0	1	2	3

FOR OFFICE CODING 0 + _____ + _____ + _____ =Total Score: _____			
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If you checked off any problems, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?

Not difficult at all	Somewhat difficult	Very difficult	Extremely difficult
☐	☐	☐	☐

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APPENDIX 1. Generalized Anxiety Disorder Scale 7 Item (GAD-7)

GAD-7				
Over the last 2 weeks, how often have you been bothered by the following problems? (Use "✓" to indicate your answer)	Not at all	Several days	More than half the days	Nearly every day
1. Feeling nervous, anxious or on edge	0	1	2	3
2. Not being able to stop or control worrying	0	1	2	3
3. Worrying too much about different things	0	1	2	3
4. Trouble relaxing	0	1	2	3
5. Being so restless that it is hard to sit still	0	1	2	3
6. Becoming easily annoyed or irritable	0	1	2	3
7. Feeling afraid as if something awful might happen	0	1	2	3

(For office coding: Total Score T ____ = ____ + ____ + ____)

Source: Spitzer RL, Kroenke K, Williams JB, Lowe B. A brief measure for assessing generalized anxiety disorder: the GAD-7. *Arch Intern Med.* 2006;166(10):1092-1097.

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Algorithm

The algorithm and user interface were programmed for use as an application on a 7-inch Android tablet.

- Both, the PHQ9 and GAD7 provides diagnoses of mild/moderate/severe levels of depression/anxiety based on scores 5-9, 10-14, ≥ 15 , respectively.
- Only scores ≥ 10 on either scale, or a positive response to the question on self-harm in the PHQ9 were considered as screen positive for this study.
- As anxiety is often the commonest presentation of depression or is a comorbid condition, GAD7 scores were also considered as indicative of depression.

The tool for the ASHAs was developed in Telugu, whereas the mhGAP-IG tool was in English. The algorithms were developed for a mobile platform and finalized iteratively using simulated data. Subsequently, mock clinical data was validated against a psychiatrist's diagnosis. As a final step, the applications were tested in one village as part of a formative process, for user acceptability, identification of issues related to functionality.

Cont'd

- ❖ Interactive voice response system (IVRS)– An algorithm based IVRS sent out pre-recorded messages to the screen positive individuals to continue care as advised by the ASHA or the doctor; to the ASHAs to screen and follow-up with their community members as per guidelines; and to the doctors to motivate them about providing services.
- ❖ Stigma Reduction Campaign: The campaign's objective was to increase mental health knowledge and reduce stigma, and was conducted prior to the baseline survey across all villages. It included a number of strategies - sharing brochures and posters on mental health awareness and knowledge with the community, using a door-to-door campaign; showing a video of a person talking about his own mental illness, and a video of a film actor talking about CMD; staging a drama highlighting issues of domestic violence, mental disorder and the benefits of getting treated in 2 villages and showing video recording of highlights in other villages.



Demonstrating feasibility, acceptability and preliminary impact of the intervention

Baseline household survey

A baseline survey was conducted by trained interviewers using tablets. The survey enquired about socio-demographic details, stressors, social network, CMD, past history of mental disorders and its treatment, family history of mental disorders, and perceptions about stigma related to mental health.

Intervention:

- ❖ Prior to starting the intervention, both ASHAs and PHC doctors were provided training on identification and management of CMD using EDSS. The ASHAs referred all those who screened positive to the PHC doctor. The doctor used another EDSS based on the mhGAP-IG tool to diagnose and manage those cases, either at PHCs or at health camps organized in villages. Individuals with severe mental disorders or any other complications were referred to mental health professionals at district hospitals.
- ❖ Treatment data was shared electronically between the ASHAs and the PHC doctors, and an algorithm-based mechanism helped ASHAs to plan follow-up schedules and prioritize individuals who needed prompt follow-up to ensure better treatment adherence. The IVRS facilitated the process. The intervention lasted for about 3 months, and was monitored by the research staff.

Post-intervention phase:

- ❖ All screen-positive individuals identified by ASHAs were re-interviewed at the end of the intervention by trained interviewers, using a survey. Additionally, focus group discussions and in-depth interviews of key stakeholders helped understand different barriers and facilitators in implementing the project.

Analysis

Table 1. Population screened at different stages of the project

STAGE OF PROJECT	POPULATION SCREENED AT EACH STAGE	n/N (%)
Total population in the villages	10676	–
Total adult population (≥18 year)	8182	8182/10676 (76.6)
Baseline survey:		
Adult population contacted during baseline survey	7152	7152/8182 (87.4)*
Adult population screened at baseline following informed consent	5167	5167/7152 (72.2)†
Population who “screened positive” at baseline	339	339/5167 (6.6)
Screening at start of intervention:		
Adult population screened by ASHAs during intervention	5007	5007/5167 (96.9)
Adult population who ‘screened positive’ at intervention	238	238/5007 (4.8)

Demographics

Table 2. Socio-demographic and health characteristics of baseline population (N = 5167)

CHARACTERISTIC	BASELINE — N (%)
Gender:	
Female	3026 (58.56)
Male	2141 (41.44)
Occupation:	
Unorganized sector*	3706 (71.72)
Organized sector	224 (4.34)
Housewife/retired	887 (17.17)
Other	350 (6.77)
Education:	
No school	2408 (46.60)
Primary school	1438 (27.83)
High school	938 (18.15)
Graduate/post-graduate	362 (7.01)
Other	21 (0.41)
Marital status:	
Never married	741 (14.34)
Currently married	3882 (75.13)
Separated/divorced/widowed	544 (10.53)
Age (years):	
Mean (SD)	39.7 (14.69)
Range	18–92
Past history of physical/mental illness based on doctor's diagnosis:	
Angina	139 (2.69)
Stroke	75 (1.45)
Diabetes	232 (4.49)
Cancer	7 (0.14)
Mental disorder	27 (0.52)

Family history of mental illness:

Presence of a family history 95 (1.84)

Substance use in lifetime:

Tobacco (cigarettes, bidi, gutka, cigars, etc.) 1502 (29.07)

Alcohol (beer, wine, spirits, etc.) 1781 (34.47)

Others (cannabis, cocaine, opioid, sedatives, hallucinogens, amphetamine, inhalants) 30 (0.59)

Severity of depression (PHQ9):

Score 5–9 (mild) 442 (8.55)

Score 10–14 (moderate) 98 (1.90)

Score ≥15 (severe) 55 (1.06)

Severity of anxiety (GAD7):

Score 5–9 (mild) 367 (7.10)

Score 10–14 (moderate) 82 (1.59)

Score ≥15 (severe) 22 (0.43)

Stressful events (number):

0 2891 (55.95)

1 1527 (29.55)

2–3 692 (13.39)

≥4 57 (1.10)

*Agricultural laborer, manual laborer, skilled worker, farmer and business are reported under unorganized sector.

Table 3. Summary of stressful events faced by individuals who had a depression or anxiety score ≥ 10 at baseline (N = 200)

QUESTION	BASILINE N (%)
Did you get married in the last 1 year?	2 (1.0)
Did you get separated/divorced in the last 1 year?	1 (0.5)
Did your spouse die in the last 1 year?	6 (3.0)
Did any of your loved ones die in the last 1 year?	43 (21.5)
Did you have a baby in the last 1 year?	2 (1.0)
Did you lose your job in the last 1 year?	2 (1.0)
Did you retire in the last 1 year?	2 (1.0)
Did you or your loved one suffer any major illness/injury in the last 1 year?	48 (24.0)
Did you have any problems with your boyfriend/girlfriend in the last 1 year?	21 (10.5)
Did you have any major problems with your school/college performance in the last 1 year?	4 (2.0)
Did you have any major financial problems in the last year?	97 (48.5)
Did you face any natural disaster or stolen livestock or death of livestock, or crop failure or forced migration leading to loss of income or property?	36 (18.0)
Did you experience any major crime or were a victim of a major crime like robbery, assault/beating, murder/attempted murder, sexual violence?	15 (7.5)

Table 4. Characteristics of the screen-positive population identified by ASHAs (N=238)*

CHARACTERISTIC	POST INTERVENTION – n/N (%)
Gender:	
Female	169/238 (71.01)
Male	63/238 (26.47)
Missing	6/238 (2.52)
Occupation:	
Unorganized sector	169/238 (71.01)
Organized sector†	9/238 (3.78)
Housewife/retired	41/238 (17.23)
Other	13/238 (5.46)
Missing	6/238 (2.52)
Education:	
No school	144/238 (60.50)
Primary school	52/238 (21.85)
High school	21/238 (8.82)
Graduate/Post-graduate	13/238 (5.46)
Other	2/238 (0.84)
Missing	6/238 (2.52)
Marital status:	
Never married	20/238 (8.40)
Currently married	173/238 (72.69)
Separated/divorced/widowed	39/238 (16.39)
Missing	6/238 (2.52)
Age (years):	
Mean (SD)	44.1(14.83)
Range	19 – 92
ASHAs – Accredited Social Health Activists	

Table 5. Change in depression/anxiety scores for those who had a score ≥10 at the beginning of the intervention as screened by ASHAs

DEPRESSION SCORE				
Descriptive statistic response	Beginning of intervention	Post intervention	Test statistics*	P-value
Depression score:				
N	73	69		
Mean (SD)	13.84 (4.14)	4.59 (5.35)		
Median	12	3		
Minimum	10	0		
Maximum	27	26		
Change in depression score:				
n†		69	-11.92	<.0001
Mean (SD)		-9.20 (6.41)		
Median		-9		
Min		-24		
Max		8		
Anxiety score:				
N	31	30		
Mean (SD)	12.42 (2.84)	3.73 (3.61)		
Median	12	3		
Minimum	10	0		
Maximum	21	15		
Change in anxiety score:				
n†		30	-9.562	<.0001
Mean (SD)		-8.77 (5.02)		
Median		-9		
Minimum		-21		
Maximum		3		

Table 6. Change in mean scores for Knowledge, Attitude, and Behavior Questions from baseline to post-intervention*

QUESTION	MEAN (SD), BASELINE, n	MEAN (SD), POST INTERVENTION, n	DIFFERENCE OF MEAN (SD), n	P-VALUE†
Knowledge:				
Mentally ill people tend to be violent	2.2 (1.34), 4401	1.6 (0.86), 193	-0.5 (1.57), 167	<.001
People with mental illness cannot live a good, rewarding life	1.9 (1.14), 4660	1.4 (0.68), 211	-0.5 (1.34), 192	<.001
People with severe mental health problems can fully recover	2.1 (1.25), 4694	1.7 (0.9), 215	-0.2 (1.43), 189	0.020
Medication can be an effective treatment for people with mental health problems.	1.6 (1.01), 4800	1.5 (0.68), 223	-0.2 (1.29), 204	0.067
Attitude:				
Mentally ill people shouldn't get married	2.2 (1.4), 4591	1.4 (0.71), 205	-0.7 (1.62), 176	<.001
People with mental health problems are far less of a danger than most people suppose	1.8 (1.06), 4714	1.4 (0.65), 207	-0.5 (1.21), 191	<.001
We need to adopt a far more tolerant attitude toward people with mental illness in our society	1.6 (0.97), 4861	1.3 (0.64), 227	-0.2 (1.11), 215	0.013
People with mental health problems should not be given any responsibility	1.9 (1.22), 4798	1.5 (0.81), 222	-0.6 (1.58), 207	<.001
Behavior:				
If you suffered from a mental health problem would you tell your family or friends?	2.8 (0.61), 5167	2.8 (0.59), 232	0.1 (0.84), 232	0.139
I would be willing to live with someone with a mental health problem	2 (1.37), 4858	2.1 (1.3), 224	0.1 (1.89), 213	0.328
I would be willing to work with someone with a mental health problem	2 (1.26), 4862	1.6 (0.84), 224	-0.3 (1.51), 213	0.004
I would be willing to live nearby someone with a mental health problem	1.9 (1.22), 4862	1.6 (0.9), 223	-0.3 (1.57), 213	0.004
I would be willing to continue a relationship with a friend who developed a mental health problem	1.8 (1.11), 4857	1.5 (0.82), 227	-0.3 (1.42), 213	<.001

*Lower scores on the Knowledge, Attitude and Behavior questionnaire indicate that respondents are more agreeable to the statement.

†Difference in means includes only paired observation; P-value is calculated using paired t-test; n=observations for each analysis.

Table 7. Change in mean scores for each barrier in the Barriers to Access to Care Evaluation – Treatment Stigma Subscale, from baseline to post-intervention*

QUESTION	MEAN (SD) BASELINE, n	MEAN(SD) POST INTERVENTION, n	DIFFERENCE OF MEAN (SD), n	*P-VALUE
Concern that I might be seen as weak for having a mental health problem	0.17 (0.45), 4416	0.07 (0.27), 232	0.16 (0.55), 216	<.0001
Concern that it might harm my chances when applying for jobs	0.09 (0.35), 1690	0.06 (0.24), 17	0 (0), 10	Not computed
Concern about what my family might think, say, do or feel	0.17 (0.45), 4416	0.13 (0.36), 232	0.1 (0.64), 216	0.03
Feeling embarrassed or ashamed	0.13 (0.38), 4416	0.09 (0.30), 232	0.09 (0.56), 216	0.02
Concern that I might be seen as crazy	0.13 (0.38), 4416	0.13 (0.37), 232	0.02 (0.59), 216	0.56
Concern that I might be seen as a bad parent	0.12 (0.38), 3848	0.1 (0.34), 218	0.08 (0.54), 193	0.04
Concern that people I know might find out	0.13 (0.40), 4416	0.1 (0.33), 232	0.07 (0.59), 216	0.08
Concern that people might not take me seriously if they found out I was having professional care	0.12 (0.39), 4416	0.13 (0.41), 232	0.02 (0.63), 216	0.66
Not wanting a mental health problem to be on my medical records	0.13 (0.43), 4416	0.3 (0.79), 232	-0.18 (0.84), 216	0.002
Concern that my children may be taken into care or that I may lose access or custody without my knowledge	0.12 (0.36), 3795	0.23 (0.71), 218	-0.05 (0.8), 194	0.37
Concern about what my friends might think, say or do	0.15 (0.40), 4416	0.18 (0.46), 232	-0.03 (0.61), 216	0.44
Concern about what people at work might think, say or do	0.14 (0.39), 4416	0.13 (0.38), 232	0.03 (0.55), 216	0.45
Overall mean	0.14 (0.27), 4416	0.14 (0.31), 232	0.03 (0.45), 216	0.39

*Lower scores on the BACE-TS suggest that the barrier is perceived less of an issue or none at all.

†P-value is calculated using paired t-test; n=observations for each analysis.

RESULTS

- ❖ Training was imparted to 21 ASHAs and 2 primary care doctors. 5007 of 5167 eligible individuals were screened, and 238 were identified as being positive for common mental disorders and referred to the primary care doctors for further management. Out of them, 2 (0.8%) had previously utilized mental health services.
- ❖ During the intervention period, 30 (12.6%) visited the primary care doctor for further diagnosis and treatment, as advised. There was a significant reduction in the depression and anxiety scores between start and end of the intervention among those who had screened positive at the beginning. Stigma and mental health awareness in the broader community improved during the project.

Conclusion

- ❖ In conclusion, the SMART Mental Health project showed that the delivery of mobile based mental health services was possible in the community and preliminary evidence suggests an increase in mental health service use.
- ❖ The feasibility and acceptability of the providing such services using evidence-based mobile applications even in remote areas where trained mental health staff are unavailable was demonstrated.
- ❖ Future research needs to use more robust randomized controlled trial methods to identify the effectiveness and cost-effectiveness of the program.



Thank you

