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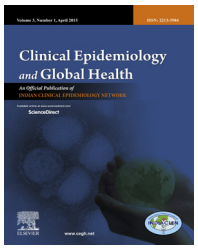

Original Article

Developing effective health communication messages for community acquired pneumonia in children under five years of age: A rural North Indian qualitative study

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ABSTRACT

Background with objectives: Community acquired pneumonia (CAP) is the leading cause of childhood deaths globally. Poor recognition of the danger signs of CAP, inappropriate care seeking, and community distrust in the primary health system are factors largely responsible for CAP related deaths in rural India. Our objective was to develop and pilot test culturally sensitive communication messages for improving symptom recognition of CAP as a means of encouraging timely health care seeking, and to promote trust in the government primary health system as an effective source of CAP treatment among children.

Methods and materials: Qualitative research was carried out between February and July 2014 in the states of Uttar Pradesh (U.P.) and Bihar in northern India. Message development entailed a six-step process: (1) theme identification, (2) creative conceptualization of messages, (3) pretesting messages in focus groups (FGs), (4) modification of messages, tagline/logo based on feedback, (5) piloting modified messages in FGs and further refinement and (6) harmonization of final communication products to ensure consistency.

Results: Messages were piloted in 49 FGs in 7 rural districts. Hindi terms for the signs of respiratory illness and lay use of "pneumonia" as a term encompassing CAP were understandable across all dialects. Five text, five audio and four video based messages were initially developed and pretested. Three text based messages, four audio and three video were deemed acceptable for pilot testing and refinement. Messages selected for use in future communication programs balanced measures of popularity with measures of maximum comprehension and least misunderstanding. Messages selected were harmonized so they would reinforce one another. Common logo and tagline ensured that the messages would be

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seen as components of a new outreach program associated with the government's efforts to address CAP as a primary healthcare priority.

Conclusions: Culturally sensitive messages for improving case management of CAP were developed through a multi-stage, evidence-based research process in a rural population. They need to accompany health systems strengthening efforts to increase confidence in government health facilities.

1. Introduction

Community acquired pneumonia (CAP) is the leading cause of mortality in children under 5 years of age, contributing to 20% of deaths globally. In 2011, pneumonia led to an estimated 1.3 million childhood deaths, more than one quarter of which occurred in India.[1] Non recognition of the danger signs of CAP and delays in healthcare seeking from trained medical personnel are primary reasons many children die of CAP in developing countries. This warrants the mounting of effective community based outreach programs to raise consciousness about how to recognize CAP, the need to act quickly when danger signs are recognized, appropriate places to seek care, and how to access assistance in locales where emergency transportation to health care center is being made available.

To understand care-seeking behavior in cases of CAP in children in rural North India, we conducted formative research (findings published elsewhere)[2] on illness perceptions and health care seeking practices of caregivers and the knowledge and health care advice of community health workers (CHWs) in seven districts of U.P. and Bihar states. This phase of research used methods recommended for focused ethnographic studies (FES) of acute respiratory infections (ARI) recommended by the World Health Organization.[3–5] Multiple qualitative methods were employed to capture cognitive, embodied, sensorial, and experience based knowledge of respiratory illness ensuring triangulation of information obtained and internal validity.[6] We found that there was low awareness of symptoms of CAP, danger signs of severe life threatening illness as well as poor knowledge about when and where to seek care. Based on these findings we conducted second stage research to develop messages (text, audio and video) to be used in an outreach communication program designed to both raise consciousness about CAP in the community and provide information on what to do in the case CAP is recognized. This paper describes in detail the methodology adopted to develop and pilot communication materials.

2. Materials and methods

2.1. Study setting

Research was conducted in 4 districts of U.P. state (population 204.2 million; area 243,286 km^2) and 3 districts in Bihar state (population 99.02 million; area 99,200 km^2) of North India (Fig. 1). Each district is administratively subdivided into blocks having a population of approximately100,000. Within each block the health infrastructure is composed of one community health center (CHC) and within the area covered by the CHC are the primary health centers (PHCs) and within PHCs, subcenters (SCs) catering to population of about 5000 (approximately 5 villages). Each SC has one auxiliary nurse midwife (ANM) and about 5 accredited social health activist (ASHA) workers, one ASHA per village.

Using two-stage random sampling, we selected one block from a district and one SC from each block. Blocks (district)

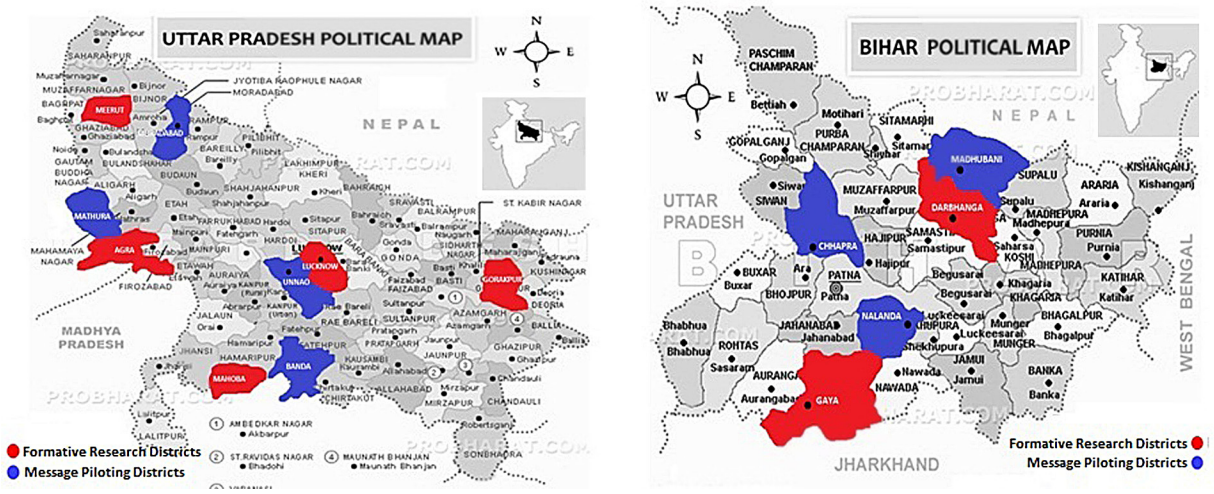

Fig. 1 – Message validation and formative research districts.

included in U.P. state were: Baberu (Banda), Kanth (Moradabad), Raal (Mathura), Nawabganj (Unnao) and in Bihar were Rajgir (Nalanda), Pandaul (Madhabani) and Jalalpur (Chappra).[7]

Research was conducted after seeking approval from the institutional ethics committee of King George's Medical University (KGMU), Lucknow. Permission to conduct research was obtained from relevant state government authorities. Written informed consent was obtained from all study participants.

2.2. Process of message development

Print, audio, and animated video messages for community management of CAP were developed by the research team with the assistance of a commercial health communication agency. A multi-disciplinary advisory group, the Childhood Pneumonia Behavior Change Communication Consultative Group (CPBCCCG) was constituted to provide oversight to the project and ensure that the content of messages was in harmony with national disease control standards. The advisory group was comprised of experienced public health, medical, and communication specialists from government and non-government institutions.

Messages were developed following six steps:

Step one: Theme identification based on prior formative analysis

Formative research was initially conducted to get a sense of what community members knew and did not know about CAP, household decision making related to health care seeking options, patterns of accompaniment to clinics, home care and health care seeking behavior for children's respiratory illness, and reasons households did not consult government health clinics. Thirty case studies of serious life threatening CAP treated at a reference hospital after considerable delay were initially conducted followed by open-ended in-depth interviews with 43 key informants (caregivers, CHWs, and rural medical practitioners) from the seven rural field sites. After preliminary data analysis, 42 additional semi-structured interviews (SSIs) with caregivers and 42 focus groups (FGs) with caregivers and CHWs further investigated key issues associated with CAP related response within households reported elsewhere.[2] Core themes identified for CAP related message development are listed elsewhere.[2]

Step two: Creative conceptualization of messages

Communication experts worked closely with the research team to develop text based messages and evocative images and story based scripts addressing core themes identified during formative research. Scripts were set in rural settings and anonymous characters were developed from real-life stories gathered during formative research. Scripts were prepared for audio and video messages in Hindi. A proactive tagline was proposed by communication experts to brand the CAP outreach campaign and harmonize "*We will not let our children die of pneumonia. We will all fight; as we are not weak*."

Step three: Pre-testing messages

Proposed CAP messages (five text, five audio, and four video messages) and the suggested tagline were pre-tested in 6 FGs in rural Kakori block of Lucknow for convenience. Participants were CHWs and caregivers of children ≤5 years with prior history of respiratory illness in last 6 months. Messages that were understood by and appealed to caregivers were selected for pilot testing in the seven field sites in the two states. Messages that were found confusing, ambiguous, or that provided limited information were rejected. The tagline was not well received during pre-testing as it was reported to be "*too long*" and "*complicated*".

Step four: Message and tagline modification

Messages were modified for comprehension and cultural relevance on the basis of feedback received during pre-testing. Three text-based, four audio-based, and three video-based messages were selected for pilot testing. To generate ideas for CAP focused tagline, existing taglines of government programs like Diarrhea Control Program,[8] National Maternal and Child Health Program,[9] Vector Borne Disease Control Program,[10] and Polio Eradication Program[11] were reviewed. Ten candidate taglines and logo used to brand the program were developed.

Step five: Message piloting

Candidate messages were piloted in 49 FGs conducted in 7 districts to assess both comprehension and the ability of community members to recall core messages. Tag lines and logo were piloted in two districts, Chappra (Bihar) and Unnao (U.P.) along with candidate messages. FGs were conducted for caregivers, ANMs, and ASHA workers. Three categories of caregivers participated: young mothers (aged <30 years), old mothers (aged ≥30 years) and fathers (aged 28–45 years). The two inclusion criteria for caregivers was that (1) they should be parent of at least one child aged 1 month to 5 years and (2) one of their children <5 years must have been treated for a respiratory illness in past 6 months serious enough to warrant some treatment outside home. Those who were not permanent residents of the village were excluded. Only one respondent per household was selected. The key eligibility criterion for CHWs was that they must have been in service for more than 2 years. All participants provided written, informed consent.

FGs with CHWS were conducted at the CHC and FGs with caregivers in villages at the homes of community volunteers. Caregivers were identified for FG participation by local ASHA workers. Stratified purposeful sampling[12,13] was used to include members of FGs belonging to different castes who regularly interacted with one another. One researcher facilitated discussion, a second researcher recorded verbal and nonverbal responses, and a third researcher drew an organogram and recorded interactions between participants.

Two FGs per category were held in every block. One FG was conducted to assess response to posters and another FG to assess response to audio and video messages. Size of the FG group was between 10 and 12 members. Large multicolored posters of size 45.72 cm × 55.88 cm were printed. Each poster was discussed individually. Audio and video messages were discussed using the same procedure. To assess comprehension we adapted a version of the teach back method advocated for use in clinical settings as an aspect of patient centered care.[14] Participants were asked to describe in their own words what messages meant and whether terms used were understandable or whether terms in local dialects were necessary.

A short time later, participants were asked to recall (i) how to recognize CAP danger signs, (ii) when and how fast to seek care for CAP, (iii) where to seek care for CAP, (iv) how to seek

care in the case of an emergency, and (v) what CAP symptoms to observe to know if the treatment was effective. The group members were then asked as to which poster, audio, and video message appealed to them and why. Participants were also asked to give their opinion on strategic locations for display of print messages and the most convenient channel (radio, television, satellite channels, etc.) for airing of audio and video messages.

All FGs were audio recorded with permission from participants, transcribed in Hindi, and translated to English. For quality control, the Principal Investigator and Co-Investigators reviewed 30% of all transcripts. Codebooks were developed and code categories identified after a review of interview transcripts and questions raised by the expert committee about CAP management. Definitions of codes were standardized. Process of coding entailed each transcript being independently read and coded by two social scientists. Discrepancies in coding were resolved by consensus and review of source documents. Data interpretation entailed a review of topics captured by codes with attention being placed on both the range and frequency of ideas expressed about a particular topic. Both specificity and ambiguity in responses were assessed and attention was paid to the clustering of ideas as well as the language used to express them.

Step six: Harmonization of messages

Messages presented in print, radio, and video were harmonized such that core messages reinforced each other and were seen as part of a multi-channel communication package. Language used in messages was cross-checked in target communities in each locale to determine whether illness terms communicated in Hindi were understandable.

3. Results

Print, audio, and video messages were developed, pretested and piloted between February and July 2014. A first order of concern was whether common language could be used across field sites or whether materials had to be customized using local dialects. Research found that Hindi terms for signs of CAP and the term '*pneumonia*' as a word connoting serious respiratory condition were understood in all seven districts of the two states.[2] Customizing messages in local dialects was therefore not needed.[2]

Five multicolored posters were created using simple language and easy to understand images for pretesting. The first poster depicted a healthy mother and child with the mother narrating how she had saved her child from the dire consequences of pneumonia by timely recognition of symptoms and health care seeking at a government clinic. The second poster depicted Integrated Management Neonatal and Childhood Illnesses (IMNCI) danger signs for CAP namely cough, cough along with fast breathing, chest in drawing, lethargy, difficulty in food intake, and convulsions. Along with each progressive sign of CAP a tiger pawmark was juxtaposed, increasing in size with increasing severity of symptom and the last one being red in color. The intent was to create awareness of not only the signs of CAP, but also the risk of delayed recognition and care seeking. A third poster featured a female doctor holding a stethoscope conveying the message to identify signs of CAP and to take the child immediately to a hospital where there is arrangement of good treatment.

The fourth poster showed a sick infant with chest in drawing pleading to the mother to save her/him from pneumonia. The fifth poster featured the image of a government ambulance offering free transportation to a government clinic for a child with CAP. Ambulances attached to government health facilities were originally designed to provide emergency transportation for mothers in cases of difficult child birth, but are now being available to transfer children experiencing life threatening CAP.

During pretesting it was found that the respondents' misinterpreted sick infant poster. In this poster, chest indrawing in sick infant was misinterpreted as an early symptom of pneumonia. It could have caused delayed care seeking. Therefore, sick infant poster was not pilot tested.

> ''When the child becomes ill, chest in-drawing starts & condition deteriorates then take the child to doctor.'' Father, Madhubani (Bihar), sick infant poster

Similarly, poster with ambulance was not pilot tested as respondents felt it lacked information on signs of pneumonia and the risks associated with it. However, image of ambulance was appreciated by the respondents as it symbolized urgency to seek health care. It was inserted in the poster of IMNCI signs. On the basis of pretesting, three posters found to be most effective and least misunderstood were those of a healthy mother and child, female doctor teaching how to recognize CAP and what to do in case of CAP, and illustration of IMNCI signs as tiger paw prints. These were selected for pilot testing and their contents are presented in Table 1.

Audio and video messages used simple stories to illustrate correct action taken by different family members, advice offered by ASHA and ANM workers, and doctors commenting on positive outcomes from appropriate action which saved the life of a child. Focal signs of CAP, namely fast breathing, chest in drawing were embedded in scripts and matched core messages found on posters. It was emphasized that prompt health care seeking from trained health care provider resulted in a positive outcome for which caretakers should be congratulated. Delay was linked to severe illness and death. Audio and video scripts addressed real world situations documented in case studies where healthcare seeking delays were associated with home care (herbal medicine and medicine purchased from local pharmacies) and initial consultations with a traditional healer or unqualified doctor leading to adverse health outcomes.

Of the five audio messages and four video messages pretested, one audio and one video message were removed for pilot testing. In removed messages, a popular movie actor gave information on CAP. Participants rejected the presence of movie actor.

> ''A celebrity can only sell biscuits. It cannot tell us how pneumonia occurs. A doctor can tell this better.'' Young mother, Kakori block, Lucknow (U.P.)

Among the 10 candidate taglines pretested, the one which appealed to most respondents was ''*We will win, pneumonia will*

Table 1 – Contents of posters ($n = 3$) used in pilot testing.

Poster type	Image used in poster	Text contents of poster
Mother-Child	Image of healthy mother and child	I defeated pneumonia!!! Earlier it was cough and cold and then fast breathing followed. We immediately took our ''*munna*'' (child's name) to a government doctor. Correct treatment by doctor saved my child's life. Correct recognition of pneumonia and treatment from a government doctor may save your child's life. Tagline: We will win, pneumonia will lose
Female doctor	Image of an experienced female doctor	We will defeat pneumonia. In order to defeat pneumonia always remember three things: 1. Look…. Is your child having fast breathing along with cough? 2. Understand…. This is the beginning of pneumonia 3. Do…Take the child immediately to a good hospital. Therefore, look…understand…do Tagline: We will win, pneumonia will lose
IMNCI signs as tiger paw prints	Image of tiger paw marks and sick child image	Do not let pneumonia progress. Seek treatment from a government doctor. Picture 1: child having cough Picture 2: child having fast breathing along with cough Picture 3: child with in drawn chest Picture 4: child who is lethargy, refuses to feed and has convulsions Tagline: We will win, pneumonia will lose

lose'' as it was simple, short, and easy to recall. The tagline was evocative and conveyed a sense of empowerment.

Communication materials were piloted in FGs in both U.P. and Bihar as a means of testing comprehension, assessing which messages were most popular and what messages were best recalled. Feedback was used to further refine messages, and select best message combinations. A total of 331 respondents participated in FGs during the piloting phase of research. 56.1% respondents were from U.P. and the rest were from Bihar. Table 2 provides details of distribution of 278 caregivers across two states and their socio-demographic characteristics. Among the 53 CHWs who participated in FGs, 72% (38/53) were ASHAs and remaining ANMs. The following are examples of some of the responses we received during FGs.

3.1. *Response to messages in posters*

Response to the three posters was assessed. Text messages were read aloud since almost half of participants were illiterate. Messages featured on posters that played up positive health outcomes from a caretaker's response to danger signs appealed to caregivers more than fear based messages. Positive messages associated with saving a child's life evoked an emotional response of empowerment by community members who now felt there was something they could do, should such an illness affect their child. Respondents linked early symptom recognition to positive child outcomes. However, many were unable to recall exactly what symptoms of pneumonia were depicted in posters, especially in IMNCI poster on danger signs for CAP. Many respondents also remained uncertain as to where to take a child with pneumonia and who to consult. It was apparent that posters alone were insufficient to convey key messages in a CAP outreach program. Those who did recall danger signs of pneumonia recognized that these signs required rapid consultation of a practitioner trained to treat pneumonia.

> ''In case there is delay the child may die too. He will have difficulty in breathing. He will not drink and will make a noise in drinking. People often do not pay attention, therefore it is late. Parents are not educated therefore they are careless.'' Old mother, Banda (U.P.)

Notably, the image of a female doctor attending to a sick child with the signs of pneumonia was found to evoke the maximum amount of trust and credibility. The image of a mother with healthy child who sought timely treatment and then the child got well was found appealing because it conveyed a sense of hope.

> ''In this (poster) the child gets fine. Mother took the child to good doctor when he started having cold, cough & fast breathing. Our child will also become fine too, if we do the same.'' Old mother, Banda (U.P.)

Other information contained in the mother-child poster that appealed to FG participants was information on how a no-cost government run ambulance can be easily availed to seek care from health staff trained to treat pneumonia and information on how CAP progresses.

Table 2 – Socio-demographic characteristics of the caregivers (*n* = 278) who took part in pilot testing (round II of FGs) of communication materials.

Category	Total (*n* = 278)		Young mothers (*n* = 97)		Old mothers (*n* = 91)		Fathers (*n* = 90)	
Median age and range	31	21–60	27	21–30	34	31–60	33	26–45
	N	%	N	%	N	%	N	%
Religion								
Hindu	266	95.68	97	100.00	85	93.41	84	93.33
Muslim	012	4.32	0	0.00	6	6.59	6	6.67
Caste								
General	050	17.99	18	18.56	14	15.38	18	20.00
Schedule caste/tribe	098	35.25	33	34.02	20	21.98	45	50.00
Other backward class	130	46.76	46	47.42	57	62.64	27	30.00
Education								
Illiterate	073	26.26	24	24.74	37	40.66	12	13.33
Literate	046	16.55	17	17.53	19	20.88	10	11.11
Primary	028	10.07	5	5.15	11	12.09	12	13.33
Middle	060	21.58	25	25.77	13	14.29	22	24.44
High school	031	11.15	13	13.40	3	3.30	15	16.67
Intermediate and above	040	14.39	13	13.40	8	8.79	19	21.11
Family type								
Nuclear	117	42.09	41	42.27	40	43.96	36	40.00
Joint	161	57.91	56	57.73	51	56.04	54	60.00
No. of family members								
1–5	105	37.77	40	41.24	28	30.77	37	41.11
6–10	144	51.80	50	51.55	54	59.34	40	44.44
>10	029	10.43	7	7.22	9	9.89	13	14.44

> ''If a person is poor & doesn't have facility for treatment or lives far away from the hospital then call 108 (free telephone number for emergency government ambulance service) from PCO (local telephone booth), give your address & an ambulance will take you for treatment. Whenever you observe symptoms of pneumonia in a child then, take him to a doctor.'' Father, Chappra (Bihar)

The poster depicting IMNCI danger signs as a tiger approaching through images of paw prints was applauded for the amount of information it provided. The respondents were not able to well recall that one must consult a doctor rapidly, as soon as danger signs are seen.

> ''If child is not paid attention on having pneumonia, then as the paw marks are increasing, so will the disease. If not paid attention in the beginning stage, risk will increase. At the same time if treated timely, disease will get controlled.'' Old mother, Moradabad (U.P.)

The respondents were asked which poster appealed most to them. Poster of female doctor appealed the most as it evoked a ''*sense of trust*''.

3.2. *Audio and video messages*

Audio and video messages were very well received. Analysis of data found that FG participants were able to recall how to observe chest indrawing and rapid breathing as danger signs of severe illness after watching video messages.

> ''Mother took advice from ASHA, she asked to lift the cloth of child & observe whether child is having fever & fast breathing. This is the first sign of pneumonia.'' Father-Madhubani (Bihar), Audio Message on mother-ASHA interaction

Both audio and video scripts (Table 3) contained messages that health care seeking from a traditional healer or village based doctor was not the best course of action when one had the signs of pneumonia and that delay in consulting a doctor may result in negative outcome. These messages were recalled by most participants. So was the message not to use traditional medicines or over the counter drugs when a child had signs of pneumonia.

> ''Villagers go to village based doctor & play with the life of child. They should take the child to a medical doctor and not waste money.'' Father-Moradabad (U.P.), Video Message

Notably, the message that one must consult a doctor rapidly, as soon as danger signs are seen, was not well recalled after participants were exposed to either audio or video messages. This pointed to a shortcoming in message development that needed to be revisited and further emphasized given its importance.

All four audio and three video messages appealed to caregivers and CHWs. However, audio message that featured mother of sick child taking help from the ASHA worker appealed the most. Respondents appreciated ASHA teaching a mother how to look for danger signs of pneumonia. The video message that featured a mother and aunt of a sick child appealed the most because it introduced the community to the idea that an ambulance could be called by the caregivers in case of CAP. Comparing audio to video messages, animated video messages had greater appeal because visuals better illustrated what dangers signs to look for and how to do so.

Table 3 – Scripts of audio (*n* = 4) and video (*n* = 3) messages used for pilot testing.

Audio with video message featuring mother of sick child and a doctor
Characters: mother ('*Kamla*') of a sick child and male doctor

Mother (self-reflecting alone in her house): *Pneumonia was snatching my child from me! Time was less. Home remedies for cough and neighbours advise that my child will get well if I took my child to a traditional healer. Would it not have been very late? When I removed child's clothes, I saw that he was breathing very fast. This was no ordinary cough! I immediately took my child to a government doctor. Then only I was able to save my child from pneumonia.*

Doctor to audience: ''*Kamala was able to save her child because she did not consider the disease as ordinary and took two correct steps: First, she recognized the symptoms of pneumonia such as fast breathing, grunting and indrawn chest. Second, without wasting any time she took her child for treatment from a government doctor.*''

Audio with video message featuring mother and aunt of sick child and a doctor

Characters: mother ('*Seeta*') of a sick girl child ('*Babli*'), aunt of child and male doctor at government health care facility

Sound of a child coughing in the background
Mother: *Sister! 'Babli' is having fast breathing. She is also feeding less.*
Aunt: *This could be the symptom of pneumonia. Just remove her clothes and closely look at her chest.*
Mother: *Sister! her chest is indrawn.*
Aunt: *This is a symptom of severe pneumonia. We need to get her treated immediately.*
Mother: *What can we do now, sister?*
Aunt: *We can call government ambulance service by dialing 108 or 102. Ambulance will come immediately and there are no charges for its services.*

Ambulance sound in the background. Sick child is taken to a public health facility accompanied by her mother.

Seeta: *Thank you so much doctor. You saved my daughter's life*

Doctor (speaking to audience): ''*Seeta (mother's name) was able to save her child because she took two correct steps. First, she did not consider cough as normal but recognized the symptoms of pneumonia, that is, fast breathing, sound of grunting and indrawn chest. Secondly, she did not waste any time, but took her child to a hospital. Even you can fight against pneumonia just like 'Seeta' by taking the correct steps.*''

Audio without video message featuring mother and grandfather of sick child
Characters: mother of a sick girl child ('*Munni*') and grandfather of the girl child

Mother: *'Munni' is having cough and fever since last four days and it has not come down yet. Home-made solution of ginger-honey did not work*
Grandfather: *Daughter, I am getting worried. Is 'munni' having fast breathing too?*
Mother: *Yes father!*
Grandfather: *I have heard that cough along with fast breathing is an early sign of pneumonia*
Mother: *Father, I am getting worried. What can we do?*
Grandfather: *Daughter, 'munni' does not need home remedies but correct treatment. It will be right to take 'munni' immediately to a government doctor.*

Audio without video message featuring mother of sick child and ASHA worker
Characters: Mother ('Radha') of a sick girl child and ASHA worker

Mother: *My daughter 'Babli' is having cough and cold since 3–4 days and they have not subsided. I bought medicine from a chemist but it proved ineffective.*
ASHA worker: *Radha; is 'Babli' also breathing fast? This could be the symptom to pneumonia. Just remove her clothes and closely look at her chest.*
Mother: *Yes ASHA sister! 'Babli' is breathing very fast.*
ASHA worker: *I was afraid of that only. Fast breathing along with cough is the first symptom of pneumonia.*
Mother: *But can pneumonia take lives?*
ASHA worker: *Yes 'Radha', that is why 'Babli' does not need medicine from a chemist's shop but needs treatment from a government doctor. Let us take her to government hospital immediately.*

Video without audio message featuring parents of sick child and a doctor
Characters: Mother of a sick male child ('munna'), father of sick child and male doctor at government health care facility
[Visual: Parent with child in government health care facility]

Mother: *Doctor, what to do? Munna is having cough that is not subsiding. He is also not as active as he used to be.*
Father: *Our village doctor gave him some medicines.*
Mother: *But he still has cough and now we can hear the grunting sound too.*
Father: *He is having fast breathing with cough.*
Doctor: *These are the signs of severe pneumonia. We will immediately start his treatment.*
[Visual: Doctor facing the audience]
Doctor: *We were able to save this child but we could have lost this fight. Please remember that cough along with fast breathing is the first sign of pneumonia. In case the chest is indrawn then it is severe pneumonia. Very often the parents are not able to recognize these signs and delay in bringing their children to us. Then it becomes difficult to save children in such situations. Recognize the symptoms of pneumonia and get treatment from a government doctor. Then we will win over this fight.*

Background multiple voices in all audio and video messages: We will win! Pneumonia will lose!

Video messages also generated empathy for characters contained in scripts.

Participants were also asked to give their opinion on strategic locations for display of print messages and the most convenient channel (radio, television, satellite channels, etc.) for airing of audio and video messages. Primary school and walls at strategic locations like market place, hospitals, and clinics were preferred for display of print messages. Mobile was the preferred channel of communication for audio messages and television for video messages.

Harmonization and refinement of final products: Outreach programs require a package of mutually reinforcing messages delivered through multiple communication channels. Poster, audio, and video CAP messages were harmonized to work well together and be seen as part of a new outreach program raising consciousness about CAP and informing community members that CHW's were trained how to recognize the signs of pneumonia, government doctors trained on how to treat pneumonia effectively, and an ambulance service available in case of emergencies requiring the transport of severely ill children with pneumonia to hospital. Poster messages were harmonized and the word ''immediate'' written before health care seeking was made red and bold to make it prominent.

To enhance effectiveness and impact, final products emphasized rapid care seeking once signs of pneumonia were recognized as the disease is life threatening and can progress rapidly. Dialogs in audio and video scripts were altered and re-recorded (Table 4) such that voice modulation emphasized the need for prompt action. Dialogs were also revised to enhance the role of CHWs in helping mothers identify danger signs of CAP and advising caregivers where to go to seek qualified care from a government doctor. The image of the health facility used in video message was redesigned to look more similar to local public healthcare facilities as some FG participants did not associate local clinics with the one depicted. In all message formats, plain language was used and key terms employed to convey common core messages. A common logo and the tagline ''*We will win, pneumonia will lose*'' branded the communication intervention.

Table 4 – Examples of harmonization/customization of audio and video messages following feedback from pilot testing.

Dialog during pilot testing	Dialog after pilot testing stage	Harmonization/customization
Mother thinking loudly ''*Home remedies for cough and neighbours advise that my child will get well if I took my child to a traditional healer. Would it not have been very late?*''	Mother thinking loudly ''*It would have been too late, had I agreed to my neighbour's advice of using home remedies or would have taken my child to a traditional healer.*''	Dialog rephrased for simplicity
Mother to Grandfather: ''*I have heard that cough along with fast breathing is an early sign of pneumonia*''	Mother to Grandfather: ''*I have heard from the ANM sister that cough along with fast breathing is an early sign of pneumonia*''	Role of ANM in management of pneumonia added in the script. Grandfather acknowledges that ANM provided information on fast breathing that helped in timely management of pneumonia.
Mother to Grandfather: ''*It will be correct to take 'munni' (child's name) to a government doctor*''	Mother to Grandfather: ''*Let us take 'munni' (child's name) to a government doctor*''	Grandfather's involvement includes both decision making and accompanying mother and child to doctor
Doctor to audience: ''*'Seeta' (mother's name) was able to save her child because she took two correct steps. First, she did not consider cough as normal but recognized the symptoms of pneumonia, that is, fast breathing, sound of grunting and indrawn chest. Secondly, she did not waste any time, but took her child to a hospital. Even you can fight against pneumonia just like 'Seeta' by taking the correct steps.*''	Doctor to audience: ''*Cough along with fast breathing is an early sign of pneumonia. Recognize it early and immediately go to a government doctor.*''	Dialog was simplified and shortened to provide simple, repetitive and limited information. This information was also consistent with other messages
ASHA to mother: ''*This could be the symptom to pneumonia. Just remove her clothes and closely look at her chest.*''	ASHA to Mother: ''*This could be the symptom to pneumonia. Let us remove her clothes and closely look at her chest.*''	Role of ASHA in management of pneumonia added in the script. Instead of observing chest indrawing alone, ASHA involves mother of sick child in the observation process.
Doctor to audience: ''*Child's mother recognized the symptom of pneumonia promptly and took her child immediately to a government doctor. Even you can win over pneumonia just like 'Radha' (mothers name) by taking right steps in right time.*''	Doctor to audience: ''*Child's mother recognized the symptom of pneumonia promptly and following ASHAs advice took her child immediately to a government doctor. Even you can win over pneumonia just like 'Radha' (mothers name) by taking right steps in right time. Correct recognition of Pneumonia and early treatment from the right doctor can save your child's life.*''	Doctor praises the mother who took correct decision. It resulted in positive outcome. Doctor acknowledges that ASHA could play an important role in pneumonia management.

4. Discussion

Based on the findings of formative research, we developed print, audio, and video messages to promote early recognition and appropriate care seeking for CAP. Formative research informed us about what was and was not known about childhood pneumonia, recognition of danger signs warranting immediate action, current treatment patterns for respiratory illness, and household decision making.

Multiple lessons were learned during the process of message development. Contents of messages had to be simple, focused and brief; key words and common themes needed to be identified for inclusion in all message formats so they were mutually supportive; images conveying desired action needed to be clear and compelling, trust had to be established for advice to be taken seriously, and authority figures in messages had to evoke trust and compassion. Messages also had to have a good balance between fear based messages (child death if action is not taken) and positive messages depicting good outcomes as the result of appropriate action. When more emphasis was placed on the latter than the former, participants in FGs felt empowered and recall increased. Readability,[15] cultural sensitivity,[15] understandability,[16] comprehensiveness,[16] use of colors[16] and simplicity[17] had to be taken into consideration while designing messages as well as attention paid to who represents the most trusted sources of information about child health. We found the image of an experienced woman doctor was most trusted. Our messages had to introduce and reinforce the idea that CHWs were a good source of information about pneumonia due to their recent training. Attention also had to be paid to the role of different family members in health care decision making with respect accorded to grandfathers and grandmothers/mother-in-law as decision makers who could make wise choices in keeping with core messages. We also found that use of a tag line and logo was important for branding a new outreach program. Our messages introduced the idea that CHWs and health staff had received training in the recognition and treatment of pneumonia, and that new resources like the availability of an ambulance in case of emergency were part of the new program. This legitimated messages calling for a shift in the health care seeking patterns of caretakers.

Our study has certain limitations. The messages developed in this study are generalizable only to those areas of India which have geographical settings, care seeking behaviors, and literacy rates similar to ours. In our field areas, we did not use local words for pneumonia in the messages because "*pneumonia*" was understood by all as an acute disease of lung in young children. This may not be so elsewhere. It is also important that community has trust in public health care system, confidence in the medications they use and on government ambulance service, etc. as our messages promote their use. Therefore concomitant strengthening of public health strengthening is essential. In some areas, Rural Medical Practitioner (RMP) may have a stronger or weaker presence, which would influence the need to engage them. It is also well documented that knowledge alone is not enough to change health care seeking behavior. Therefore, effectiveness of these messages in bringing about behavior change has to be tested. This is being done in an on ongoing study in Lucknow district (INC2015GNT003).

Several strengths of the current study are worth noting. First, we developed culturally appropriate and technically sound messages for CAP using a systematic multi-stage research process. Our message development was not a top down desk exercise. It drew upon a solid base of qualitative data collected on community perceptions about respiratory illness, common courses of home care, patterns of health care seeking, and caretaker confidence in different forms of medical practitioners and types of treatment. The six step process of message development followed a procedure validated elsewhere.[18] This research process places emphasis on pretesting and piloting messages in the community as a means to identify those messages with maximum comprehension (and least misunderstanding) and best recall and popularity. Our approach followed longstanding health communication experience that has found that a suite of products introduced in different communication channels yields best results when messages are mutually supportive and harmonized increasing recall.

Our final suite of communication materials are freely available online.[19] They can easily be used by CHW and NGOs in outreach education campaigns. We recognize that effective communication materials are not enough to change health care seeking practices. It also requires trust in government health care providers as being well trained to treat CAP, and confidence in the medications they use. Our communication messages depicted well intentioned and knowledgeable staff. This needs to be demonstrated through their routine practices. Future messages will need to be developed to increase faith in medications offered in government health care centers. This was outside the purview of the present project because it required shifts in medication packaging. Formative research in this project and reported elsewhere[2] suggests that medication in blister packs normed for children of different ages may increase caretaker confidence in both the product and child health programs.[20] Many members of the community in India see medications used in government health facilities as being poor quality compared to medications purchased in chemist shops and prescribed by private practitioners. Future messages will also need to address to RMP who presently see many cases of pneumonia in the community. These practitioners are very popular in much of rural India. It will be important to familiarize them to recognize the signs of CAP and to encourage them to refer cases of CAP promptly as respected participants in a community-based CAP program committed to saving children from pneumonia related death.

5. Conclusion

This study illustrates how a suite of health communication messages can be developed through systematic research yielding products that are well received by literate and illiterate community members and which not only raise consciousness about a life threatening illness for children, but provide information on best courses of action, and address decision making in households. Messages were designed based on formative research that identified predisposing, enabling and service related factors influencing health care

seeking for CAP.[2] Next steps will include conducting a trial evaluating the effectiveness of the messages in reducing childhood death in communities in which health care center staff have received training/refresher training in how to recognize and treat CAP, medicine supply is adequate, an ambulance service is in place, and referral protocols have been established. It is our hope that along with health systems strengthening, evidence-based health communication can reduce child deaths due to CAP significantly and help achieve sustainable development goals.[21]

Conflicts of interest

The authors have none to declare.

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