Barriers and Facilitators to the Use of Cardiovascular Fixed-Dose Combination Medication (Polypills) in Andhra Pradesh, India

A Mixed-Methods Study

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ABSTRACT

Background: Polypills, fixed-dose combinations of blood pressure—lowering drug(s), and statin, with or without aspirin, improve the use of these recommended drugs in patients with or at high risk of cardiovascular disease. However, in India, there has been poor uptake of polypills despite market availability.

Objectives: This study sought to assess availability and cost of polypills and explore barriers and facilitators to their use in the state of Andhra Pradesh in India.

Methods: A mixed-methods study was conducted. Availability and cost of polypills as well as individual component drugs was assessed through a survey of pharmacies across urban, urban slum, and rural regions in state of Andhra Pradesh in India. In-depth interviews with stakeholders at each level of the health system explored barriers and facilitators to use of polypills.

Results: Overall, 30 pharmacies were surveyed (10 in each of urban, urban slum, and rural region). In urban region, 2 pharmacies stocked polypills (without aspirin) costing 121 Indian rupees (INR) per 10 pills, and 1 other pharmacy stocked a polypill (with aspirin) costing 24 INR per 10 pills. All pharmacies stocked a wide range of component drugs as separate pills with combined cost of the cheapest angiotensin-converting enzyme inhibitor, statin, and aspirin INR 124 per 10 pills. Patients were willing to use polypills if prescribed by their doctor, and pharmacies were willing to stock polypills if there was market demand. For prescribers, key barriers included perceptions that current polypills contained outdated drugs and inadequate flexibility in prescribing.

Conclusions: In a market in which polypill use is licensed, their availability and use is very low. Lack of prescription of polypills was the predominant barrier to polypill use; therefore, making polypills with drugs that are more acceptable and at different available strengths, in conjunction with broader prescriber education and training, may improve their use.

Despite established evidence of reductions in cardiovascular mortality and morbidity with the use of cardiovascular drugs in people with or at high risk of cardiovascular disease (CVD) [1—3], treatment gaps are very large. The majority of patients with established CVD and those at high CVD risk, particularly in low- and middle-income countries, either do not receive or remain adherent to these treatments long term [4]. Use of fixed-dose combinations (FDCs) (i.e., polypills) containing blood pressure (BP)—lowering drugs and a statin (with or without aspirin) has been recommended by the World Health Organization [5] as well as the World Heart Federation [6] as a potential solution to addressing this known poor use of recommended CVD preventive therapies. The SPACE (Single Pill to Avert Cardiovascular Events) collaboration trials have demonstrated the effectiveness of a polypill based—strategy in improving use of recommended therapy, and improvements in systolic BP and low-density lipoprotein cholesterol [7]. More than 25% of participants in the previous SPACE collaboration meta-analysis were from India. However, despite locally generated evidence as well as regulatory approval of several polypills, uptake of polypills in India has been slow and remains limited [8]. Therefore, we conducted a study to assess availability and cost of polypills and explore the barriers and facilitators, from the perspectives of key stakeholders, for the use of polypills in India.

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METHODS

Study design and participants

The BASIC (Barriers Analysis of uSe and Implementation of Combination treatment in India) study was a mixed-methods study involving quantitative and qualitative components, conducted between January and July 2017.

Quantitative survey of pharmacies

Data on availability and cost of polypills, as well as BP-lowering drugs, statins, and aspirin as individual pills were collected from private pharmacies across 3 geographically and sociodemographically diverse regions (urban, urban slum, and rural) in a single Indian state (Andhra Pradesh). We adapted the method of selecting pharmacies reported by the PURE (Prospective Urban Rural Epidemiology) study [9]. For the rural region, villages within a 30-km radius of Bhimavaram in the West Godavari district were targeted. Field staff travelled from Bhimavaram in each of the 4 geographic directions to identify a village with a pharmacy. In each village, the first visually identified pharmacy was approached and invited to participate. Only 1 pharmacy from each village was recruited, and at least 2 pharmacies from each of the 4 geographic directions (east, west, north, and south) were recruited. In the urban region, 2 pharmacies were recruited from the list of 5 officially designated geographic zones in Hyderabad. In each zone, field staff identified a geographic center point, from which they traveled toward their right-hand side and the first visually identified pharmacy was approached and invited to participate. The same approach was used for sampling pharmacies in urban slums, except that in each of the 5 zones, slums with large populations were targeted. In each region if the first approached pharmacy declined to participate, then the next visually identified pharmacy was approached, until 10 pharmacies agreed to participate.

Field staff completed a structured questionnaire on in-pharmacy availability of 2 types of polypills: a polypill (without aspirin) containing at least 1 BP-lowering drug and statin and a polypill (with aspirin) containing at least 1 BP-lowering drug, statin, and aspirin. Field staff visually identified and collected data on brands of polypill available, price of cheapest and costliest brand, and number of pills in each pack. The same data were collected for the 5 major classes of BP-lowering drugs (angiotensin-converting enzyme [ACE] inhibitors, angiotensin receptor blockers (ARBs), beta-blockers [BBs], calcium-channel blockers, and thiazide type/like diuretics), as well as separately for any type of statin and aspirin. Information on available combinations of BP-lowering drugs were not collected. To facilitate identification of polypills, field staff requested the pharmacy staff to review a list of polypills approved in India (Online Table S1) that was made by searching online sources (CIMS, Medline India, and DrugsUpdate).

Qualitative interviews

Interview guides with questions relevant to each stakeholder's role were developed from the literature [10–12], and from expertise among the multidisciplinary team of study investigators, in line with the objectives of the study. Interview guides included open-ended flexible questions on awareness, use and opinions of the role of polypills in the management of CVD as well as identifying barriers and facilitators to use of polypills within the Indian health care systems (Online Table S2). Staff trained in qualitative research conducted in-depth interviews with stakeholders from all levels of the health care system including patients, physicians, pharmacists, and officials from government and pharmaceutical Industry. The study aimed to recruit 4 patients per region, 2 pharmacy staff per region, 4 physicians per region, senior health administrators at the regional and national levels, and up to 2 pharmaceutical company representatives. Interview data for each group were reviewed for thematic saturation and if needed further interviews were sought. Participants were offered monetary reimbursement for their time. Interviews were conducted either in the participant's native language (Telugu or Urdu) or English depending on participant's preference. Except for 1 interview conducted over the phone for the convenience of the participant, all were conducted in person, audio-recorded, transcribed, and translated, if required, into English.

Recruitment of interviewees

Patients presenting to the pharmacies participating in the quantitative survey, and taking BP-lowering drugs, statins, and aspirin were identified through pharmacy staff. Following obtaining of verbal consent, pharmacy staff passed on patient's contact details to the interviewer who conducted the interview at a time mutually convenient to the patient and the interviewer. Sequential patients were invited to participate until 4 patients per pharmacy in each region had agreed to participate, and consented. Pharmacists who participated in the quantitative phase of data collection were also invited to the qualitative interviews. Two pharmacy staff per region were recruited. Several methods of recruitment were used to identify physicians (both general physicians and cardiologists). Physicians identified by the pharmacy staff as prescribers of cardiovascular drugs in the local area were approached along with personal contacts of the investigators. Relevant representatives of public health administration at the state and country levels were identified and invited to participate, and we also invited representatives from the Indian pharmaceutical companies that are manufacturing polypills.

Ethics

The study received ethics approval from the University of Sydney Human Research Ethics Committee as well the Centre for Chronic Disease Control, New Delhi, India. All participants in the qualitative part of the study provided written consent.

Quantitative data analysis

Data were analyzed using SAS Enterprise Guide version 7.15 (SAS Institute, Cary, North Carolina) and presented using simple descriptive statistics including ranges, and medians with interquartile range for skewed data.

Qualitative data analysis

Two researchers (A.S. and R.W.) independently read transcripts thoroughly for immersion in the data. The researchers then coded the transcripts independently in NVivo version 11 (QSR International, Melbourne, Australia), and subsequently met and discussed the codes. Codes were reviewed, renamed as per consensus, and given a brief description to form the analytic framework. One researcher (A.S.) coded the rest of the transcripts using the analytical framework and second researcher (R.W.) reviewed the coding, and necessary changes were made to the codes and their structure as per consensus. After all transcripts were coded, data were summarized in a matrix for each theme in Microsoft Excel version 2016 (Microsoft Corporation, Redmond, Washington). From this framework matrix, themes across interviewees were compared, while identifying patterns and connection between the categories, and identifying divergent themes to generate memos for a rich description of the phenomena relevant to the objectives of the study.

RESULTS

Quantitative survey

Fifty-seven pharmacies were approached for quantitative data collection, of which 27 pharmacies did not participate, 2 from rural, 16 from urban, and 9 from urban slum areas. The most common reasons for nonparticipation were pharmacy closed (8 pharmacies), not interested (7 pharmacies), and lack of time (5 pharmacies). Data from 30 pharmacies (10 from each region) were collected and included in analysis.

Availability of polypills, BP-lowering drugs, statins, and aspirin

Information on availability and cost is reported in Figures 1 and 2 (and in detail in Online Table S3). Polypills (without aspirin) were available in 2 pharmacies in the urban region, and the brand of polypill that both these pharmacies stocked was the same (of the possible 32 approved) (Online Table S1). A polypill (with aspirin) was available only in 1 pharmacy in the urban region (of the possible 7 approved). In 2 pharmacies in the rural region and 3 in the urban slum region, statins were not available, and in 1 pharmacy in rural region, aspirin was not available. However, all pharmacies in all areas stocked multiple brands of BP-lowering drugs from at least 2 classes. In most pharmacies, thiazide-like/type diuretic agents were not available as a single drug pill.

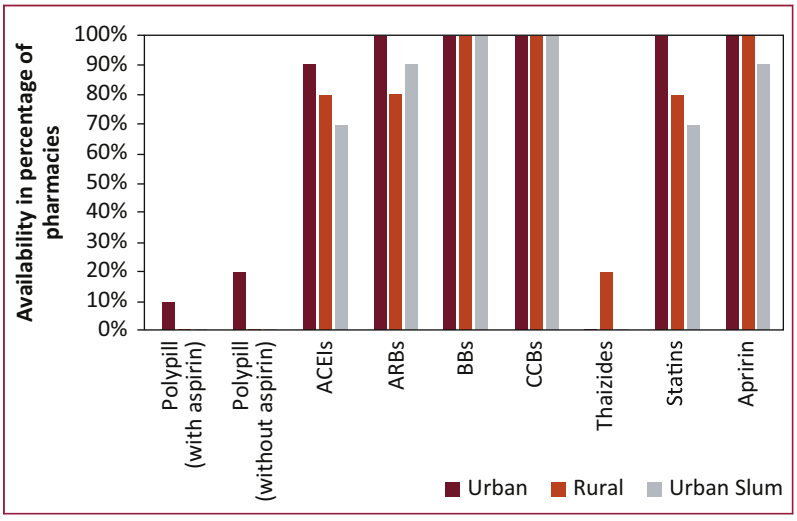


FIGURE 1. Availability of polypills, BP-lowering drugs, statins, and aspirin. ACEI, angiotensin-converting enzyme inhibitor; ARB, angiotensin receptor blocker; BB, beta-blocker; CCB, calcium-channel blocker.

Cost of polypills, BP-lowering drugs, statins, and aspirin

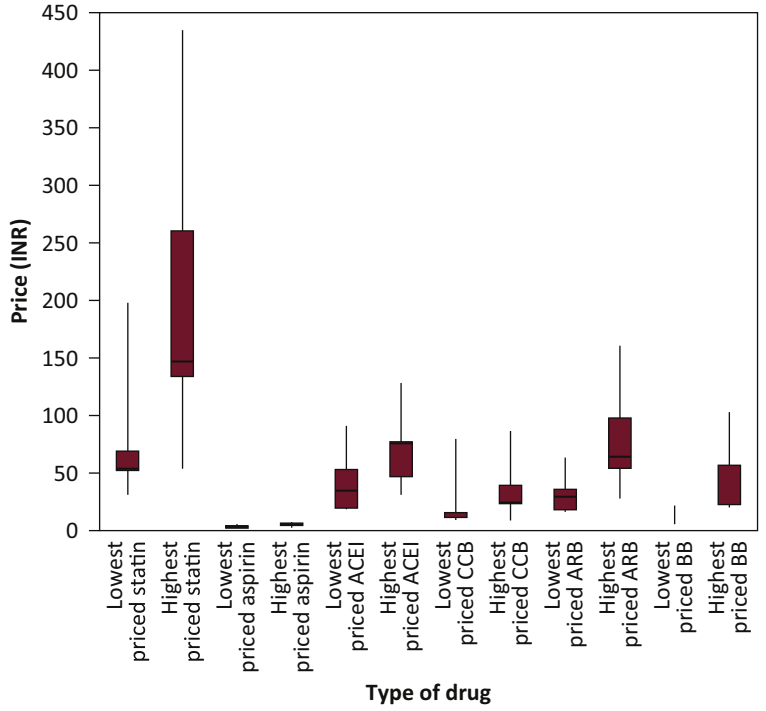
The cost of the only available polypill (without aspirin) was Indian Rupee (INR) 121.3 for 10 pills, and the cost of the only available polypill (with aspirin) was INR 24.1 for 10 pills. Prices of individual BP-lowering drugs, statins, and aspirin varied substantially across brands and dose versions. For each class of drugs, median prices for lowest and highest priced brands are shown in Figure 2. The combined cost of the lowest priced ACE inhibitor, statin, and aspirin was INR 123.9 for 10 pills, more than 5 times as expensive than the polypill (with aspirin) but comparable to the cost of polypill (without aspirin).

Qualitative interviews

Of the 12 patients interviewed, all were men, mean age was 62 years, 11 had established CVD, and 8 had diabetes. All were on BP-lowering drugs, 11 were on a statin, 9 were on aspirin, and 1 was on a polypill (without aspirin). Two patients reported using a combination of 2 BP-lowering drugs or a combination of 2 antiplatelet drugs in the past. A total of 11 physicians (4 general practitioners, 7 cardiologists) and 6 pharmacy staff (3 pharmacists, 3 aides) were interviewed. A representative of the central health administration and a representative of pharmaceutical industry were interviewed, and attempts to interview a regional health administrator and more pharmaceutical industry representatives were unsuccessful. Interviews lasted 15 to 40 min. A summary of barriers to use of polypills are reported in Figure 3.

Barriers to use of polypill

Patients. Most patients considered their current cardiovascular treatment to be costly, and for some a



Median costs of the lowest and highest priced drug in each class are presented due to the broad range of brands available and associated range of costs.
Boxes show Q1 to Q3 of the data with a solid line at the median. Whiskers show maximum and minimum values of the data.

FIGURE 2. Cost of polypills, BP-lowering drugs, statins, and aspirin. INR, Indian Rupee; other abbreviations as in Figure 1.

significant financial burden ("I did not stop all medicines for 1 or 2 months, but used main tablets like for BP [Blood pressure], Sugar[Diabetes]. Due to money problems, I had to wait for a month or ten days to buy."). Patients without experience of taking polypills wanted to know if polypills would be more expensive ("How costly is it? After asking if it is costlier it may be financial problem to us, is it not?"). The only patient who was using polypill (without aspirin) reported higher cost of polypill compared with separate pills used previously. One patient also expressed concern as to whether there would be sufficient versions of polypills with drugs and dosages that suit different people. Most patients were unwilling or reluctant to ask their doctor about polypills because they viewed doctors as the health experts to make treatment decisions and it was culturally inappropriate to advise doctors, or they were fearful of being censured by the doctor ("I will not tell. Doctor gets angry if I suggest him, he might say why you came to me…").

Pharmacy staff. Most pharmacy staff were generally aware of polypills for CVD; however, they referred to them commonly as combinations (of which many exist on the market, not just polypills). Only 1 pharmacist had polypill in stock during the interviews and 1 other pharmacist reported stocking them in the past and later stopping due to lack of prescriptions. In general, pharmacies did not stock polypills because of lack of prescriptions from the prescribers ("We take the opinion of the doctor whether to keep polypills or not, if he prescribes more polypills and asks us to keep polypills then we may keep."; "Suppose if patient asks now, we bring it if it is available in the market."). One pharmacy reported that polypills were recently banned, probably confusing them for other irrational combinations which were recently banned by the government ("They [polypills] were banned recently, because of heavy dosage they were banned, Government banned them").

Prescribers. Awareness of polypills was generally high among prescribers. Most prescribers had never prescribed a polypill, and some had only in the past. Barriers to use of polypills fell into many categories. Polypill-related barriers included perceptions of use of outdated or undesirable component drugs in the currently available polypills ("If you include atenolol, who will write it…If you look at the prescriptions of the doctors, they are more in favoring a ARB rather than ACE inhibitor, so if you have polypill which contains ACE inhibitor so automatically the usage will be little less."), lack of multiple dose versions of polypills ("What dose you are giving in 1 polypill, that wide range of availability is not there of different statin, because we cannot expect all the people to be controlled with 10mg of statin or a 5mg of ramipril."), challenging presentation of currently available polypills including large size, or availability of all components in a kit form rather than in a single pill ("Some of the patients feel the size is too big and in some there are kit, they get confused, because they are not so much educated.").

Prescribers also did not like the perceived loss of flexibility to titrate the doses of the component drugs (particularly BP-lowering drugs), and especially felt they were not suitable for patients who already have established CVD ("When patient comes to us basically, they already are heart patients, where we need to titrate the drugs each and every time they come to us, that flexibility is not there with polypills."). Issues related to perceptions about the pharmacology and evidence of effects of polypills included, not being sure of gaining expected benefits from the individual drugs because of concerns of bioavailability of component drugs, perhaps due to concerns about substandard and falsified medicines ("The thing is, there are so many companies trying to make this cocktails, and I am sure, I hope I am wrong, but we do not have that kind of a confidence that as far as when they are made, the company takes very due diligence in making sure that bioavailability is not an issue."). There were also perceived barriers related to whether polypill components should all be taken at the same time ("Antihypertensives we are used to give in the early morning after breakfast, but if at all they combined with these statins, statins should be given in the night, then

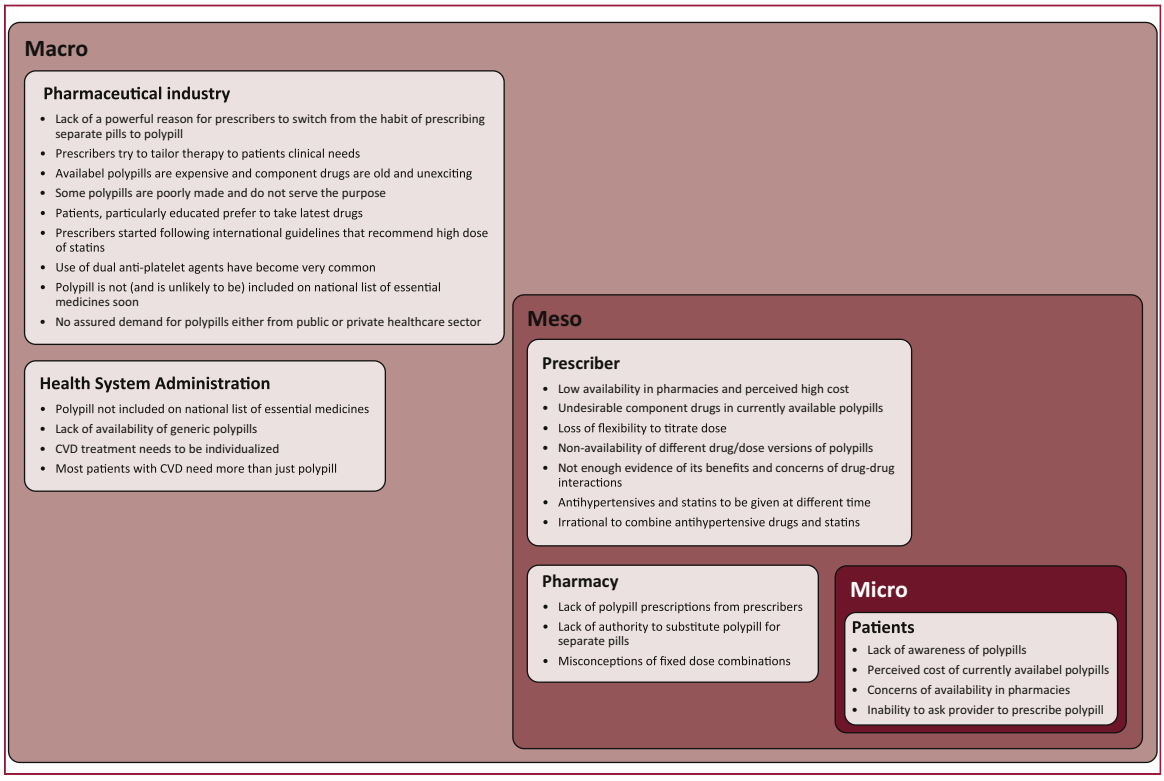


FIGURE 3. Framework illustrating barriers to use of polypills. CVD, cardiovascular disease.

that is problem."). General practitioners, particularly in rural regions, considered polypills as irrational combinations, even though component drugs are all indicated in patients with established disease ("No, there is evidence against it. I have not gone through the very recent studies but earlier at least 4 years ago there was evidence against it, against the use of polypill in many of the conditions, not only CVD but even other as an antidiabetic or as an antihypertensive regimen, polypills are mostly avoided."). Prescribers also reported patient-related barriers: concern that a patient's nonadherence to the polypill means nonadherence to all component drugs.

Public health administrator. The administrator interviewed was a senior policymaker in the central Indian Ministry of Health and Family Welfare. For them, the major barriers to use of polypills in the public health care settings included, nonavailability on the national list of essential medicines (NLEM), which is partly due to nonavailability of low-cost generic polypills. In terms of clinical use of polypills, there was appreciation of its benefits of improving adherence ("Personally feeling it should be there, if I was DG [Director General] I would have included [in NLEM] it anyway."). However, it was also suggested that treatment of CVD needs to be individualized considering patient characteristics including, age, gender, and comorbidities. In that context, it was viewed that polypills do not allow flexibility and people might need more than the polypill.

Industry representative. From the industry perspective, manufacturing difficulties were perceived to be lesser barriers compared with market barriers (prescriber-, patient- and health system—related barriers). It was suggested that prescribers are generally used to prescribing separate pills, and it is hard to change that behavior ("They would still tend to, I think prescribe individual components, and the reason is that,…they are quite used to prescribing, so they need a powerful reason to switch."). It was believed that prescribers try to tailor therapy to patient's clinical needs, and the specialists are initiating treatment with more intensive therapy than is available in polypills ("Key opinion leaders as well as the upper rung of doctors have all pretty much switched to international guidelines for therapy. So they are starting with far more intensive dose."). It was also believed that most of the currently available polypills are expensive and have outdated component drugs, suggesting that patients, particularly the educated group, prefer to take newer and better drugs ("There are 350 million cell phone [mobile phone] users in India and they are all connected to the net [Internet] and at least half of them go to these specialists and so they are constantly on the net and they figure out what is what. And if you go and prescribe simvastatin for example, they say what is this? You are giving a dreadful drug!"). The

industry representative also reiterated that polypills are not in the public health system because they are not on the NLEM.

Facilitators to use of polypill

Patients. Most patients were willing to use a polypill if it were prescribed by their doctor. Patients' perceived benefits included, a smaller number of pills, lower frequency of taking pills, less chance of forgetting to take pills, potential for lower costs, and as a solution to the unpleasant feeling of taking many pills ("Patient will feel psychologically dull if he is taking many tablets, he will be irritated to take a lot; it will be a great relief for Patient."). Patients were most positive about potential cost benefits ("Three times tablets may cost more, if it is one tablet cost may come down."; "I hope the prices may come down."; "It may be cost effective."). Therefore, polypills that area less costly than separate pills are likely to be desirable by patients.

Pharmacy staff. Most pharmacy staff had positive views of polypills: the cost of polypills was perceived to be low compared with separate pills, and patients would like to take a polypill if it is less costly; it will be easier for patients to take a polypill compared with multiple drugs; patients will not have a psychological feeling that they have many diseases for which they have to take many drugs; and it would be easy to explain the treatment regimen, particularly, to the uneducated and elderly ("There will be no problem of remembering, forgetting, again educating the patient becomes easy. Usually elders will be there, if there are 4-5 types of medicines they may take same medicine again."). The perception of pharmacy staff was that product marketing representatives influence prescribing behavior of doctors; hence, evidence of benefits of polypills should be channeled through them to doctors. Pharmacy staff also believed that awareness among patients should be increased, as they may not be satisfied with a polypill (a single pill) if they believe that their condition needs multiple pills, particularly if they are not aware that polypill has multiple drugs in it. Overall, pharmacy staff perceived that treatment decisions are made by doctors; therefore, the major driver for use of polypill is generating prescriptions from the prescribers.

Prescribers. Prescribers had specific ideas about the drugs that they would want to see included in a polypill if they were to use it. They also suggested the need for polypills of different doses of constituent drugs and 2 antiplatelet agents. Those who have been prescribing polypills, or those who were willing to prescribe, would stabilize patients on individual constituent drugs before switching to polypill, suggesting specific ways in which polypills would be used in clinical practice ("I stabilize the patient separately with the same drugs and showing that it is safe and then try to put a matching polypill on it. That's how I practice."). Other perceived facilitators included government procurement and supply of polypills to public health centers, cost of polypills being lower than the combined cost of component drugs, multiple manufacturers to generate cost competition, wider availability, dissemination of evidence of benefits of polypill to doctors though conferences and medical education programs, and public education campaigns ("Yeah, dissemination of the evidence should be there, even to the public, not just to the doctors. The public awareness should improve.").

Public health administrator. According to the health administrator, facilitators to use of polypills in the public health care system included, government initiatives to introduce polypills containing combinations of drugs that are already on the NLEM and that cover most patients' medical needs. A major driver would be to have polypills that are at a low or the same cost compared with component drugs on the NLEM put together. This can initially be included on the state list of essential medicines in which the burden of CVD is high, with demonstration of benefit and then subsequent expansion to other states.

Pharmaceutical industry representative. From the perspective of the industry representative, 2 key things could facilitate uptake of polypills: 1) working with the government to develop national health policy around integration of polypills into clinical practice, including simple and clear guidelines on secondary prevention of CVD, an area where use of polypills is less controversial; and 2) demonstrate benefits of polypills (in terms of better outcomes, cost of care) compared with current usual care at the community level. Working on these 2 simultaneously in collaboration with the government was perceived to influence both the public and private sectors.

DISCUSSION

This study assessed the availability and cost of cardiovascular polypills, and barriers and facilitators to their use in Andhra Pradesh, India. Compared with the availability of BP-lowering drugs, statins, and aspirin, availability of polypills in pharmacies was very low, with wide variation in the cost of the 2 versions available. Major barriers to the use of polypills related to physician reluctance to prescribe polypills because of perceptions of outdated or undesirable drugs in the currently available polypills, lack of different drug and dose versions of polypills, perceived lack of evidence for their effectiveness, and nonavailability on NLEM for use in public health system.

Potential facilitators to improve polypill use included availability of polypills with physician preferred component drugs, multiple polypills with different drugs and doses, low cost, physician education, government intervention to promote use of polypill in the public health system by including it in the NLEM, and demonstration of polypill benefits in community studies.

Strengths of this study include that it is the first study to assess availability, cost, and barriers to use of polypills

in India, where multiple polypills are available on the market. Our study covered a range of sociodemographic regions and explored views of all the relevant key stakeholders.

Limitations included that we employed convenience sampling and many pharmacies, particularly the busy ones in the urban region, declined to participate in the survey. Therefore, pharmacies that participated may not be representative of the all pharmacies in the region. Also, it is possible that pharmacies that did not participate may have had 1 or both the versions of the polypills, thereby underestimating the availability of polypills. The cost of drugs collected was the maximum retail price printed on the drug packs; however, in practice, some pharmacies give discounts ranging from 2% to 15%, and therefore, our costs may be overestimated. The number of interviewees for industry and public health system representation was only 1 each, and our efforts to recruit more were unsuccessful. Given that polypills are not available in the public sector, prescribers in that sector were not interviewed. However, interviewing prescribers in the public sector would have helped to understand their views of polypills should these become available in that sector. Additionally, because of field staff interviewing sequential patients presenting to pharmacies and not specifically aiming to achieve equal genders representation, all patients interviewed were men and their views may not be representative of women. In India, in general, it is the male members of the family who go out and buy medicines for the family members. Therefore, this could also suggest larger gender inequality in access to health care due to sociocultural barriers. Finally, the results of this study may not be generalizable to the rest of the India because only 1 rural and 1 urban regions was studied.

A large multicountry community-based study published in 2016 by Khatib et al. [9] assessed availability and cost of 4 classes of cardiovascular drugs (ACE inhibitors, BBs, statins and aspirin) in urban and rural localities. This study reported high availability (>80%) of these drugs in India. Our study found similar levels of availability, including another 2 classes of BP-lowering drugs (ARBs and calcium-channel blockers). In our study, availability of thiazide-like/type diuretic agents as individual drugs was low, as these drugs are often available and prescribed in combination with other drugs.

In our study, cost of polypill (without aspirin) was 5 times higher than the cost of polypill (with aspirin). The reasons for such a large variance is cost are not clear, however one reason could be that cost of brand name drugs in India are traditionally higher than those manufactured by generic companies. In our study, the identified polypill without aspirin was produced by a multinational company, whereas the polypill with aspirin was produced by an Indian generics manufacturing company. Some of the low-dose versions of individual drugs were priced higher relative to the high-dose versions. This could be in part due to the Drug Price Control Orders issued by the federal government thereby declaring ceiling price for essential drugs to make them available at a reasonable price. An alternate possibility is the risk of substandard and falsified medicines. The PURE study estimated combined monthly median cost of 4 cardiovascular drugs (statin, aspirin, BB, and ACE inhibitor) in India (INR 595) was potentially affordable to about 40% households, at a threshold of 20% for household capacity to pay [9]. In our study, by using capacity-to-pay estimates from the PURE study, and a threshold of 20% for household's capacity to pay, it can be inferred that the polypill without aspirin (INR 364) would be affordable to >50% households and the polypill with aspirin (INR 72) would be affordable to most households.

Several previous studies have investigated the acceptability of the polypill concept across a range of different contexts [12]. One of these studies [13] included the opinions of physicians in the United States and reported low-to-moderate awareness of polypills. In contrast, our study reported high awareness. One possible explanation for this could be the time gap between the previous study and this study, during which there has been increase in polypill related research and media coverage. It could also be due to the fact that India has several types of polypills on the market already whereas in the United States there is only 1 polypill. Overall concerns around polypill use in these broader studies were similar to those expressed by prescribers in India including: perceived inflexibility of prescribing, components drugs not reflecting recommendations of current guidelines, lack of personalization of treatment, uncertainty if polypills would provide an equivalent therapeutic benefit to separate pills, adverse effects from combining several drugs into 1 pill, Influence on lifestyle measures, and consequences of nonadherence (i.e., patient is then not adherent to all medications).

Polypills have great potential to significantly contribute to addressing the current and growing epidemic of CVD and the component drugs are all recommended for the management of CVD within the current clinical guidelines. However, this study has shown that there remain barriers to the use of polypills in India, particularly at the physician level. Overcoming these barriers will require improved education and dissemination of information amongst Indian physicians, identification of key local opinion leaders who can act as champions to promote the use of polypills and address the current misunderstandings, and working with the Indian health system to develop relevant policies that support the integration of polypills into the current health system.

Further, additional local evidence generation through pragmatic and implementation studies is likely to be required to demonstrate improvement in patient outcomes with the use of polypills. Inclusion of polypills on the NLEMs will be required for use in the public system.

CONCLUSIONS

Making available polypills with physicians' preferred drugs, at different strengths of constituent drugs, and at lower cost compared with separate drugs is likely to improve their use. Demonstration of benefits of polypill at the community level and inclusion in the NLEM is likely to be necessary before introducing polypills into the public health system.

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