Community-Clinic Linkages: Qualitative Provider Perspectives on Partnering with Community Health Representatives in Navajo Nation

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Abstract

Objective: To understand providers' opinions about the Community Outreach and Patient Empowerment (COPE) Project designed to strengthen Navajo Community Health Representative (CHR) outreach to individuals living with diabetes.

Methods:
Study Design: This was a prospective, qualitative study nested within a larger evaluation of a program intervention.
Setting: The study took place in Navajo Nation.
Participants: 13 healthcare providers took part in qualitative interviews.
Intervention: The program was designed to strengthen community-clinic linkages between Community Health Representatives and clinic-based healthcare providers and provide structured outreach to individuals living with diabetes in Navajo Nation.
Analysis: A team of three study staff used open-coding to create a codebook. Discrepancies were discussed and finalized based on group consensus. Coded material were summarized and patterns were identified and tied into a narrative using concept mapping.

Results: Providers supported CHRs' access to EHR to record patient visits and streamline referrals. Providers were enthusiastic about the COPE coaching materials, mentioning they provided a consistent message to CHRs and the community. Providers that led COPE trainings with CHRs valued the face-to-face time and opportunity to build relationships. Among their requests were having designated personnel to manage referrals with CHRs and a formal system to record modules CHRs have completed.

Conclusion: Providers participating in COPE trainings valued the work of CHRs and endorsed further strengthening relationships and communication with CHRs. CHW programs should consider systems changes to integrate CHRs into clinic-based teams.

Article Summary:

Strengths and Limitations:

- Qualitative data presents first-hand information regarding the provider experience in a community-clinic linkage program.
- Active participation throughout the study by a Community Health Advisory Panel enriched the interview questions and interpretation of findings.
- Although saturation was obtained, the total number of participants was small and limited to providers who were involved in COPE.

Background:

In resource-poor communities, access to health care services is often inadequate. In these settings, Community Health Workers (CHWs) are healthcare professionals who can link patients to clinical facilities thereby improving patient health outcomes[1, 2]. One key strength of CHWs is that they represent the communities that they serve and thus deliver outreach in a culturally appropriate manner[3, 4].

Although serving a vital role in connecting patients to the healthcare system, research has shown that CHWs have largely been structurally excluded from major aspects of the healthcare system. Conversely, when CHWs are integrated into the healthcare system, they are effective at improving healthcare outcomes for patients[5-7]. Effective integration of CHWs into the care team allows CHWs to share vital perspectives of the home environment to clinic-based healthcare providers who may have little or no insight into patient's living situation and psychosocial surroundings. By expanding community-clinic linkages and connecting CHWs with the healthcare system, CHWs are better able to support both the patients and providers in forming an effective patient-centered care team [5, 8].

In many tribal communities, Community Health Representatives (CHRs) are a long-standing workforce of community health workers who provide culturally-sensitive outreach to families living in vastly rural communities [9]. Because CHRs are typically operated as tribal programs and healthcare services are often delivered through the federal Indian Health Services, coordination between CHRs and clinical providers may be limited. In an effort to integrate CHRs with local clinic-based teams, a collaboration among the Navajo CHR Program, Navajo Area Indian Health Services (NAIHS), and Brigham and Women's Hospital was established in 2009. The goal of this initiative, called Community Outreach and Patient Empowerment or COPE, was to support community-clinic linkages and integrate CHRs with healthcare teams. The impact on CHR-provider communication and clinical outcomes have been described elsewhere [10].

The aim of this study is to describe the program's impact on the experience of clinic-based healthcare providers. To our knowledge, this is the first study to explore the provider reported perspective and recommendations towards the utilization and integration of CHWs, including CHRs, into "cross-institutional" healthcare teams [11].

Methods:

Study Setting

The Navajo Nation is a federally recognized American Indian tribe in the United States covering regions of Arizona, New Mexico and Utah. Similar to other communities with few economic resources within the United States, the Navajo Nation lacks the infrastructure to allow for consistent access to quality health care. This largely stems from rural nature of the reservation, which has unpaved roads, long distances from patients' homes to healthcare centers, and a high degree of provider turnover within the healthcare facilities [12, 13].

Partially due to these inequities, diabetes and cardiovascular disease stand as some of the leading causes of death within American Indian and Alaskan Native communities within the United States [14, 15]. It has been estimated that roughly 25,000 Navajos have diabetes (around 21.5% of the adult population), and another 75,000 have been diagnosed with prediabetes [16].

Among Navajo people, cardiovascular disease and diabetes represent the third and fourth leading causes of death, respectively [17].

The Navajo Nation is divided up in to separate local governances called “chapters”. These chapters are grouped geographically and represented by eight Service Units (SUs) within the NAIHS. Each Service Unit has a health facility, sometimes with several satellite clinics.

Within the Navajo Department of Health, the Navajo CHR Program employs approximately 141 staff, including 99 CHRs, within the CHR, Tuberculosis and Sexually Transmitted Disease Prevention Programs [18]. Navajo CHRs are required to be trained as a Certified Nursing Assistant (CNA) and must speak Navajo. Many CHRs have additionally obtained certification and credentialing beyond the CNA required for the job, including CHW Certification through the state of New Mexico [19]. Typical services provided by Navajo CHRs include home visits to monitor vital signs and provide health education, referrals for additional services and resources needed by their client, community outreach for urgent or emergent issues, and health fairs and other health promotion activities. Each CHR is assigned to one or two chapters (usually where they themselves live). A CHR office is usually provided by the community within the Chapter House. CHR teams are organized by Service Units, with a team office typically located close to the service unit’s main healthcare facility.

COPE Intervention

The COPE intervention consists of three main strategies: creating systems for referral, coordination and communication between CHRs and clinic-based providers; providing high-quality training to CHRs on health topics and motivational interviewing; and developing standardized outreach materials for CHRs to use with patients living with diabetes [4]. This intervention was delivered under program auspices; thus, the research to evaluate COPE’s impact was observational in nature.

Initially, COPE Project staff met with the Navajo CHRs to determine what additional tools COPE could provide to increase the level of patient care for the CHRs. CHRs stated that a standardized set of patient teaching materials would be the most important aspect to improve their health care delivery on the Navajo Nation. COPE staff worked with CHRs and health care providers to develop culturally-specific health education materials in the form of flipcharts.

COPE staff then facilitated monthly trainings on these health education materials at all eight Service Units. For each training, the COPE team invites a local healthcare provider to deliver the training on their specialty or area of interest and provides the training materials (learning objectives, materials, competency assessment) to the trainer in advance. CHRs complete pre- and post-competency assessments, and both CHRs and trainers complete a feedback form to evaluate their satisfaction with the event and seek further suggestions for improvement. CHRs who receive a passing score ($\geq 70\%$) on their post-competency assessment are then given the flipchart to use with their patients; if they do not pass, COPE staff schedule a follow-up one-on-one training to review materials and re-administer the competency assessment.

Of note, one of the concerted efforts of the COPE Program was to create access for the CHRs in the Electronic Health Record (EHR) used by most Indian Health Service facilities. Nationally, CHWs have faced barriers documenting their patient encounters and communicating their observations to clinic providers. When COPE began, CHRs did not have access to the EHR. As a result of the COPE Program and supportive clinic providers, two of the Service Units were able to grant CHRs access to EHR. CHRs in those service units underwent HIPAA and information security training prior to gaining access to the electronic systems. Specific templates were created for providers to make referrals to CHRs and for CHRs to document their home visits. Improvements in communication were shown as a result of this system change [19].

Study Population

COPE research staff approached healthcare providers via phone, email or in person. Providers were approached based on having a previous experience or involvement with the COPE Program. Roles of COPE involvement by providers varied greatly from leading CHR training, facilitating meetings between clinic staff and CHRs, and referring patients to the CHR program. Interviewers did not share personal information with the participants beyond their interest in understanding the research objectives. Sampling ended when saturation was achieved.

Study Design

Research study staff developed the qualitative interview guide, with feedback from our Community Health Advisory Panel (CHAP). The interview guide was designed to understand the provider's experience working with CHRs and also specifically interacting with the COPE intervention. The interview guide was then presented and reviewed by CHAP, which is comprised of Navajo CHRs, patients, and the family members of patients. The goal of this review was to ensure the research and interview guide was culturally-informed and would elicit information of interest to patients and family members. Upon review, the CHAP recommended adding two questions that focused on food access and traditional/holistic medicine. The final interview guide is included in **[Supplement].** CHAP also provided feedback on the study findings, to ensure that interpretation of findings were consistent with their own perspectives as CHRs and patients.

Three trained study staff conducted in-depth interviews lasting 15-35 minutes (CB, AL, and CK). Interviews were conducted in English, either in person in clinic or by phone, and either transcribed verbatim by a note taker or digitally recorded and then subsequently transcribed. Transcripts were not reviewed by interviewers.

Research Team

The research team consists of one non-Navajo, female Physician who is also the study's Principle Investigator and organization's Executive Director (SShin, MD, MPH degree); five young male and female researchers working as either interns or study coordinators (CB, AL, CK, CC, and SSalt), all with BA's, and three of which are Navajo (CB, CC and SSalt); one Navajo, female Community Outreach Manager at COPE, who has also worked as a CHR (OM), one non-Navajo, female Clinical Applications Coordinator at Navajo Area Indian Health Services (KR, CNM degree), the Navajo female Program Director of the Navajo CHR & Outreach Program (MGB, MSW degree), and one non-Navajo female Qualitative Researcher/ Research Manager employed at Brigham and Women's Hospital and stationed at COPE (AKN, MPH, Msc degree). SShin has worked for twenty years as a researcher dedicated to community health interventions for patients with tuberculosis and HIV at Partners In Health sites including Haiti, Peru, and Russia and has led COPE since 2009. AKN has been working with Partners In Health as a Research Assistant and Qualtiative Researcher for nine years. MGB has been the Program Director for the Navajo CHR/ Outreach Program for eighteen years.

Data Analyses

Grounded theory was used to analyze qualitative data [20]. All transcriptions were de-identified and uploaded into the Dedoose software [21]. Themes were not determined in advance, rather they emerged from the interview data. A team of a qualitative researcher (AKN) and two research assistants (CB, AL) coded interviews using open coding to identify the following 4 main themes which made up the final codebook: general interaction with COPE, implementation of COPE within the service unit, the impact of COPE, and improvement of COPE and related activities. Interviews were then reviewed again by the same team and coded independently. Inter-rater reliability was tested and kappa scores of 0.49, 0.49, 0.46 were achieved. Discrepancies in coding were discussed with a qualitative researcher and finalized based on group discussion. Coded material was summarized into paragraphs, and patterns were identified and unified into a narrative using concept mapping.

Choice of terminology

In this study, the study team decided to use the term CHR (Community Health Representative) instead of CHW (Community Health Worker) which is a broader term inclusive of CHRs. Navajo CHRs refer to the community members that they work with as clients rather than patients; for this reason, we use the term "clients" although providers may refer to the same individuals as "patients."

The term providers used throughout this paper is intended to be encompassing of multiple different hospital staff that have direct contact with patients. Examples of providers interviewed range from doctors, nurses, public health nurses, CHR supervisors.

Ethical considerations

The Ethics Committee of Partners Healthcare and the Navajo Nation Human Research Review Board approved the study. All participants signed a consent to participate in this study.

Results:

A total of thirteen providers from five service units were interviewed **[Table 1]**. Three main themes emerged from the qualitative analysis: acknowledging the importance of community-clinic linkages, endorsement of COPE training and materials, and an appreciation for CHR access to electronic health records.

Acknowledging the Importance of Community-Clinic Linkages

Overall, most providers (10) explicitly acknowledged the importance of the CHR role and described CHRs as an asset to the clinical side due to either their role as a liaison between clinic and community, outreach work, knowledge in health education and management, knowledge of community/resources, and ability to see patients in their own living environment. Almost all providers felt that there was a need for increased formalized collaboration, specifically in the form of an interdisciplinary team.

So, I guess if we just had better sort of interaction with them or communication [And that's quarterly reporting or communicating—] Yeah! [laughter] And we were more sort of aware of it, we probably could, you know, reach out to them more and utilize them more and they could utilize us more too.

- *Provider*

I think that if, you know, we could collaborate more it would benefit, you know, the patient population that we work with. There's many people that could be seen (laughs), and I think that sometimes, because of the overwhelming numbers, not as many patients get touched because we don't even think about referring. There's so many numbers of patients.

- *Provider*

Multiple providers suggested increased face-to-face collaboration through the creation of formalized multidisciplinary health teams, regular inter-professional meetings consisting of PHNs, CHRs, clinicians, nurses, and diabetes educators. Informational meetings to learn about respective programs could also increase an understanding of how programs could work together. One provider expressed concern that CHRs are hard to get to know since they are not based at the hospital.

I think, arranging, you know, actual meetings, physical meetings, you know with the PHNs, CHRs, clinicians, providers, nurses, you know, um… in the concept of a team. So I think the FVRx started, is a great start, for um thinking of a clinical team, but if you think of that more broadly, I think that's sort of going to be the bigger issue, um, but we think about, um, service unit wide, so if it's all going to be taken care of in that community, the providers in that community, then you know it's a little easier, to kind of find people. But we can think maybe more, um, creatively about that, like let's say I have a health team…. and I have a team, and what are the two, the community health workers and PHNs assigned to that team.

- *Provider*

It'd be great if we could get to know certain CHRs better, um, so we could really maintain communication with them, and they would feel more comfortable talking to us, um, so that's one of the, uh I think there's other complications to that. [Right.] But I think, you know, just being able to get to know the CHRs better, um I think would increase communication, and, um have them be more comfortable talking to me, calling me about patients, um but, uh that would really change up some of the ways that we practice, so…

- *Provider*

I think making it more official and like actually probably setting meetings like, like it probably would be great for them to meet with the diabetes educators 'cause they could do, umm, you know some of the requests for teaching the CHRs, it'd probably great for the diabetes educators to help. 'Cause they're RN-level providers, so they could actually help with a lot of the diabetes education with the CHRs and, so that's—I think there's a lot of ways that we could all kind of work together better.

- *Provider*

Providers cited case management as a formalized way that many service units currently arrange for different fields to come together to discuss patient care. While more than half of the providers reported ongoing case management teams in their service unit, they described mixed feelings toward case management. While some providers (3/6 who had case management at their facility) felt that case management was useful and worth the time investment, others (2) expressed skepticism because they felt it was unnecessary or time-consuming. Providers indicated that barriers to successful case management programs included high provider turnover, short staffing, and lack of time or inflexibility in schedules.

Well we would have um every two weeks the um, well the first thing that I did was um tried to learn who the CHRs were in each of the communities. And then we divided up um where they would be a part of the um conference care um at least every other month, okay. [Okay.] Every two weeks we would have a round table care conference, with one or two of the CHRs. Again they would bring two or three of their complex care needs clients to the table for discussion, and our follow up would involve the families, if we could get them to come— [Right.] --To the hospital, for an on-going care conference, um plugging them into different services that maybe they needed.

- *Provider*

Within a few weeks after they had never used case managers, here in the diabetes program before, and I had been a case manager in Alaska for, I don't know, the last fifteen years. So I brought the concept of um, you know of um, case management to the uh table, and our CHRs began to um identify some of their problem clients in the community. And we would have complex care case management, um, conference meetings with the public health nurse, the doctor, the um, uh, family, all the family members, and tried to get as much clear understanding what some of the problems or barriers to care were. And um, before long the CHRs and the public health nurses began working really, really, really close together. [Oh good!] And we were just seeing the success of the uh the whole idea, the whole program.

- *Provider*

When I first came here, there was very little, if any, medical staff communication with the CHRs. [Okay.] Even the public health nurses and the CHRs didn't dialogue. [Right.] It was only after we started doing the round table discussions to address complex needs, for some of our very, very difficult clients, that a lot of the CHRs started feeling that they had something to contribute. And this is what we were pounding home, you're the one to have eyes and ears on these people, you're very valuable. [Right.] And um over a period of time, they started understanding that they were an asset, um that they had things to offer that no doctor, very, very few nurses, would understand, because they were in the home. They can see things that we would never see.

- *Provider*

Lastly, many providers mentioned their own or their colleagues' lack of awareness of the COPE Project. Because of high provider turnover rates, one provider suggested quarterly meetings with progress updates so new providers are able to learn about COPE's efforts while established providers are updated on the current progress.

Umm, and we do unfortunately have a lot turn over in providers here so, [yeah] I think it's something that it would be good to do actually, maybe like quarterly and it could be sort of like an update on COPE like, "how we've changed, what we're doing now," [got it] for the providers that already know about it. But it, that would also give an opportunity to educate the people that have just joined the staff in the past couple months. 'Cause, umm, you know, I think if they do it like once a year or something, like we have so many new staff that, you know, it's *going to —we're going to reach some people, but then there are going to be this whole other crop that started in like the past six months that have no idea what it is.*

- *Provider*

Ideal for it, things like that would be helpful from COPE, you know, just to kind of let us know. One thing that's important for is like also, for me as a clinician I want to know like, who… outcomes, you know. Like if someone is going to take the CHRs time and resources, to send them to a place to do this, I want to know that it works, you know? [Right, definitely.] I want to know that it actually… for which patients does it work, and how do we um… utilize…. [What's the most effective way to use it.] Yeah.

- *Provider*

Endorsement of COPE training and materials

Providers felt that the health education materials and trainings provided by theCOPE Program helped to foster collaboration with CHRs by increasing message consistency. Most providers recognized the "COPE Flipcharts" as a powerful health education resource for CHRs, patients, and the clinics. Providers reported the large variety of topics and use of visuals in the COPE health education materials were thought to be helpful in relaying information.

The COPE program had been very vigorous… they were developing the flip charts, those were so well done.

- *Provider*

There's a lot of health topics that they've covered. When I see they're monthly activity, there's a lot of topics- using the flipchart and having a resource available that they can use.

- *Non-clinical Staff*

Making the modules, the little flipcharts, I think that's a good idea for staff to have. They pull it out for a topic, and I know it's consistent with what we teach. The feedback for competency issues, I know that when you guys do the testing, I know that they're competent to teach what they're teaching. That makes a big difference.

- *Non-clinical Staff*

In the community, we share hand-outs. Like today we did the in-service on meters. If I can tell them the process and protocols that we use here, I know that they're [The CHRs] teaching the same things out in the community.

- *Non-clinical Staff*

The pictorials from the COPE flip charts really prompts them to use the same language. It's a tool so that they don't have to come off the top of their head. It's consistent to at least one degree.

- *Non-clinical Staff*

Interestingly, by increasing the consistency of the information taught by both clinical and homecare teams, the health education materials also built trust and confidence in the CHRs among providers and patients. Many providers felt that having provider-led trainings aided in delivering a consistent message to CHRs, and ultimately to the patients.

Well, through bolstering the education that the Community Health Workers receive, I think it's … making sure what their story is matched by what the patients receive in the hospital as well. We've always had a disconnect, historically, between the community health worker's level information that they receive and give to the patient and what that story is in the hospital. In other words the community health worker might tell the patient one thing, and then the patients receives completely different level information in the hospital, and now the patient doesn't trust anybody. [Right.] And now, the community health worker is receiving the same story as the patient gets told in the hospital, so the patient has trust because they're hearing the same information because the community health worker is now educated, and COPE has been that bridge. [Great!] And that has been a wonderful thing.

- *Provider*

I think, having the providers—the primary care providers participate in education with the CHRs, I think, is really important. 'Cause that way, um, you know, the providers, I think are more likely to refer to the program because that the providers have the confidence, that it's gonna, you know, about the types of information the CHRs are going to provide. And their knowledge base and things like that.

- *Provider*

Providers felt that educational materials could be further used to reach a broader audience. While providers reported feeling that both the educational materials and flipcharts were helpful, some providers felt that the materials were currently underutilized and that it would be helpful to record which CHRs had received training in which modules. One provider noted the challenges around discussing topics that are considered taboo on the reservation, such as alcohol use. This provider suggested the "COPE Flipcharts" could provide CHRs with more confidence in addressing these topics and patients could be more receptive. Some providers suggested creating additional modules centered on alcoholism, liver disease, and cirrhosis.

I mean obviously there's lots of topics that I would love for um, the CHRs to be able to go out and um, talk to patients more about. I think alcohol is probably one of the big things, um you know cirrhosis and liver disease, and how to protect your liver, um, I guess one ar…you know clinical area of interest for me, so I would love for the CHRs to feel like they have the tools to be able to talk about that in the field, um, … so, um I think that probably any service unit has a big problem with the alcohol use disorder, so umm… I don't know if you have other ideas that I could say would be helpful or not.

- *Provider*

The education is, is something that works well. I do think that um, more patients could benefit from the education that COPE is providing.

- *Provider*

The majority (n = 8) of providers interviewed indicated they had delivered at least one CHR training, using COPE materials. Providers stated that the trainings ultimately increased face-to-face time between providers and CHRs. During these interactions, the providers felt they were also able to directly address CHR concerns and questions.

Right, right, so that's something we get a little concerned about so, it was nice that COPE has started to invite the providers to give some of those teaching sessions, 'cause that way we can make sure the message the CHRs are delivering is in line with the same message that like we deliver to patients when they come to their clinic visit about diabetes or hypertension, or STIs or things like that [sure, okay].

\- *Provider*

I mean I definitely, I mean I haven't been here long. But um I, I mean my one interaction was them face to face has been with the, at least the um, the talk I gave. And I was able to address some concerns that they had. Um but yea, I mean you guys are big uh, a big interface to allow the community to interact with the, the hospitals. I mean I think, I think it's a huge, it's a very beneficial program.

\- *Provider*

Providers indicated, however, a lack of clarity around which CHRs were trained in which COPE modules (topics). Providers stated they would have appreciated knowing what topics the CHRs were trained to deliver. Providers reported they could use this information to identify the best patients for referral and request specific health education topics for individual patients. One provider suggested possible regular updates on recent CHR trainings.

I think they have all the materials of kind of like um resources but I don't know how much I can actually use them, and I don't actually know if they go through the whole curriculum at all, or I have no idea. But um… it would be helpful for them to know, you know, how, how to do that. [Definitely.] I think it reminded me talking to you guys that I think this, because I forgot about this. Um, but I think that something we can do better as far as what people know, but I don't know, again, which patients would be up for it, or…

\- *Provider*

CHRs access to Electronic Health Records

Providers acknowledged their support for CHR integration into EHR to record patient visits and streamline referrals, regardless of whether their service unit currently had this system in place.

Two providers from a service unit where CHRs had access to EHR reported they were aware that CHRs in their service unit had access to the EHR. These providers stated that their ability to send referrals to CHRs through the EHR has been valuable in seeing CHR notes with ease. Providers also felt the EHR helped to close the feedback loop between their practice in the clinic and the CHR's combined community outreach and public health education. They then acknowledged that this increased the ability for CHR-provider interaction and enabled providers and CHRs to collaborate more easily.

When I see the patient and I kind of look through their chart, and I see that the CHRs left a note, um I will say, you know I will address some of the things that were mentioned un there, and it's…I hear that one of our CHRs came out to visit you, they were mentioning this that and the other, I'm concerned about that.

- *Provider, in SU with EHR access*

Providers reported they used the EHR to share information about their patients with the CHRs. In some cases, providers reported that they would modify their care plan based on critical data provided in the CHR notes. Overall, providers reported that the feedback from the CHR through the EHR system was both useful and appreciated.

I see that the CHRs left a note, um I will say, you know I will address some of the things that were mentioned un there, and it's…I hear that one of our CHRs came out to visit you, they were mentioning this that and the other, I'm concerned about that. So it's mostly through either if they call me and they leave a note in the chart, or um, and then sometimes, you know if that means that I need to see the patient sooner, um, I might try to schedule the patient sooner. Um, but uh, yeah, so I would say that's the most [inaudible], that's why I think the EHR note is so helpful.

- *Provider, in SU with EHR access*

In contrast, providers who worked in service units without access to EHR reported difficulty in locating CHR documentation and receiving feedback from their referrals to the CHRs. Providers stated that they felt CHR's paper records from their home visits were cumbersome to read and providers eventually stopped requesting them. They also described frustration when they failed to hear back from the CHR after making a referral due to limited follow-up communication. They felt that they could not determine whether the patient was successfully visited or enrolled in the CHR's care, nor discern what occurred at these visits.

Right. I, I think when I first started here we were getting paper, umm, uh, summaries of their visits with people, patients. And they were not part of the record. It was an informal thing for us to review. It was very long, complex, and they didn't get incorporated into the chart in anyway [so you'd forget?]. So it wasn't something that we used, really [right]. And that stopped soon after I got here [got it]. I, I don't think anyone has received anything—maybe they have, me personally, I have not received a single thing in over—probably over a year.

- *Provider in SU with no EHR access*

"Well I feel like there are challenges because, um, their um for instances um, we don't share, they don't have shared EHR electronic notes, [Right,] So we don't always get a chance to see what is being done with that CHR and patient in the community. I mean they do a note, and it probably goes in the chart, but we're sort of getting away from that now, from the hard copies charts, so I mean if it's not in EHR, I really don't pull a chart unless I absolutely have to. [Right,] So that piece could be improved, and I think it can happen, but it just need to be some network with the right folks"

- *Provider, EHR access unknown*

Well um I think um I guess I'm having difficulty I don't know if like uh, like if it, if you guys get notified in uh, in a good way when I put in a referral. Um I don't get notified, I mean it asks for *my email or some sort of context information. I do put in my email and then… [Uh huh.] But then but um sometimes I don't get some, um any uh feedback in terms of what was the outcome of the visit, if there was any um interaction done at all uh with some of the patients.*

- *Provider in SU with no EHR access*

Providers at sites where CHRs did not have access to the EHR endorsed the prospect of granting CHRs access to EHR in the future. One provider stated that receiving feedback from CHRs via EHR would encourage providers to continue referring patients to the CHRs because they would be able to see the results of their referral and further incorporate the CHR notes into their patient's treatment plan.

Getting those like little EHR notifications, I think it is really helpful because, um, if you refer to a program but you never get any feedback on how your patients are doing, or what's happening, it's kind of discouraging and people often won't continue to refer if that's the case. So, I think like getting some sort of feedback about what interventions are performed with the patient, how their doing, things like that really encourage the providers to continue to refer.

- *Provider in SU with no EHR access*

Discussion:

Three main themes emerged from the perspectives of the providers: an acknowledgement of the importance in developing clinic-community linkages, an endorsement of the COPE materials being delivered by the CHRs, and the necessity for CHRs to be integrated into the EHR. The themes that emerged are similar to other situations on a national level where health care providers grapple with a further integration of CHWs into clinical care teams [8, 22]. Although difficult, other studies have shown positive outcomes from this integration [23]. The positive remarks from providers in this qualitative study works to support the current literature on this subject and encourages integration of the "quadruple aim" of improving provider experience alongside the standard triple aim [24].

Providers recognized the critical role of the CHRs in the healthcare team and felt that increased interactions (e.g. informational exchanges, inter-professional meetings including case management, and quarterly progress updates) would strengthening the relationship between CHRs in the field and providers in the clinic.

Almost all the providers interviewed responded positively to the COPE materials and the quality of the health education that CHRs were delivering in their communities. By involving local providers in the development of educational materials and delivery of training, providers had confidence in the materials and felt reassured that information provided by CHRs would be consistent with what patients were being told in clinic. We felt that this was one of the strongest aspects of the intervention. Provider-led trainings increased collaboration with CHRs by building trusting relationships and stimulating greater collaboration.

Our findings support the need to integrate CHRs through shared access to the Electronic Health Record. EHR access has provided a quick and streamlined process to refer patients to CHRs and critical sharing of important information that improved providers' ability to care for their patients. As healthcare systems move increasingly toward paperless systems, providers rarely review hand-written notes by CHRs [25]. This provider perspective highlights the importance of advocacy among clinicians to facilitate CHR access to EHR. Across tribal communities, many Indian Health Service sites utilize the same electronic health record system, providing a unique opportunity to utilize training and clearance protocols as well as EHR templates developed in Navajo to any interested site.

Our study has several limitations. Because COPE team members conducted the interviews, providers may not have been as truthful about negative experiences. However, we feel that providers were very honest about their experiences with the COPE Program, the Navajo Area IHS System, and the Navajo Nation CHR Program based on their wide range of responses. All of the providers that were interviewed as a part of this study had some relationship to the COPE Program. While the study was designed to focus on providers who were involved in COPE, interviewing providers not involved with COPE could have provided input into how to involve more providers. In fact, those who participated in this study felt that more providers should be aware of this program and the role of CHRs. They suggested that the materials could be used to provide health coaching to more patients, and also emphasized the need to increase awareness of CHRs and the COPE intervention among the broader community of clinic-based providers.

Conclusion:

Providers who worked with CHRs and the COPE intervention expressed a strong appreciation for the unique role of CHRs and the value of COPE's standardized health education materials and CHR trainings. At a system level, providers were able to work more closely with CHRs when they shared access to Electronic Health Records. Successful integration of community health workers into interprofessional healthcare teams may inform CHW programs across a variety of settings. Further research to better understand the patient experience would complement the provider perspective.

Declarations:

Ethics:
The Ethics Committee of Partners Healthcare and the Navajo Nation Human Research Review Board approved the study. All participants signed a consent to participate in this study.

Consent for Publication:
All study participants provided informed consent for their data to be used in research and publication.

Availability of data and materials:
All research data is property of the Navajo Nation as per Navajo Human Research Review Board (NHRRB) protocols. Investigators who seek to use this data would need to request permission from the NHRRB and provide reassurance that their request is consistent with applicable privacy, confidentiality and other legal requirements.

Competing Interests:
Dr. Sonya Shin discloses that she serves as the Executive Director for a 501(c)3 organization, entitled Community Outreach and Patient Empowerment Program which continues to support the described program, since study completion.

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The views in this publication are solely the responsibility of the authors and do not necessarily represent the views of the Patient-Centered Outcomes Research Institute (PCORI), its Board of Governors or Methodology Committee.

The Navajo Nation Human Research Review Board as well as the Partners Institutional Review Board reviewed and approved the study protocol. All results have been presented to the Navajo Nation Human Research Review Board (Protocol #NNR-11.150).

Author contributions:
CB led the qualitative analysis team as a junior investigator. He coded interviews, conducted analysis, and drafted all sections of the manuscript.
AL was part of the analysis team and helped conduct and code interviews, conduct analysis, and edit the final manuscript.
CC was part of the analysis team and helped to code interviews, conduct analysis, and edit the final manuscript.
CK conducted and transcribed interviews and provided edits on the final manuscript.
OM was part of the analysis team and provided input on the results and final manuscript. She is a Navajo researcher with experience working as a CHR.
SS was part of the analysis team and helped to code interviews, conduct analysis, and edit the final manuscript.
KR works for IHS and is involved in the design, maintenance, and advocacy for the use of the EHR across all Navajo health sites. She provided feedback about the EHR and its function within the Navajo health facilities during data collection and analysis and edited the final manuscript.

MGB is the Program Director of the Navajo Nation Community Health Representative and Outreach Program. She provided feedback during the design of the study, data analysis, and edited the final manuscript.
AKN is a qualitative researcher. She guided the team in the methods of designing the study and conducting data analysis, incorporated edits from all authors. She provided a qualitative methods perspective to the final manuscript.
SS is the PI for this study. She guided the team in the design of this qualitative study and provided high level support in the analysis and drafting of the manuscript. She provided clinical perspective on the findings.

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Table 1. Occupation and Number of Participants

Job Title”	Number of Participants
Provider	**11**
Non-clinical Staff*	**2**

*Note: Provider includes Physicians, Public Health Nurses, and Registered Nurses. Non-clinical Staff includes CHR Supervisor and Diabetes Educator. Quotes are not linked with specific Service Units or job titles in order to protect participants’ confidentiality.

References:

1. Brown HS 3rd WK, Pagán JA, Arcari CM, Martinez M, Smith K, Reininger B. : **Cost-effectiveness analysis of a community health worker intervention for low-income Hispanic adults with diabetes.** *Prev Chronic Dis* 2012, **9**.
2. Condo J: **Rwanda's evolving community health worker system: a qualitative assessment of client and provider perspectives.** *Human resources for health* 2014, **12**.
3. Pérez LM MJ: **Community Health Workers: Social Justice and Policy Advocates for Community Health and Well-Being.** *American Journal of Public Health* 2008, **98:**11-14.
4. Gampa V, Smith, C., Muskett, O., King, C., Sehn, H., Malone, J., Curley, C., Brown, C., Begay, M.G., Shin, S., Nelson, A. K.: **Cultural elements underlying the community health representative – client relationship on Navajo Nation.** *BMC Health Services Research* 2017, **17**.
5. Allen CG: **Strategies to Improve the Integration of Community Health Workers Into Health Care Teams: "A Little Fish in a Big Pond".** *Preventing chronic disease* 2015, **12**.
6. Shah M KE, Heisler M.: **The Role of Community Health Workers in Diabetes: Update on Current Literature.** *Current diabetes reports* 2013, **13:**163-171.
7. Malcarney MB PP, Quigley L, Horton K, Seiler N.: **The Changing Roles of Community Health Workers.** *Health Serv Res* 2017, **52**.
8. Findley S MS, Hicks A, Chang J, Reich D.: **Community health worker integration into the health care team accomplishes the triple aim in a patient-centered medical home: a Bronx tale.** *J Ambul Care Manage* 2014, **37:**82-91.
9. **Navajo Community Health Representative.** [http://www.nndoh.org/chr.html]
10. Trevisi L, Orav, J., Atwood, S., Brown, C., Curley, C., King, C., Muskett, O., Sehn, H., Nelson, A.K., Begay, M.G., Shin, S.: **Integrating Community Health Representatives with Health Care Systems: The Impact on Clinical Outcomes in Navajo Nation.** In *American Public Health Association Annual Meeting; November 4-8; Atlanta, GE.* 2017
11. Sequist TD, and Elsie M. Taveras.: **Clinic–community linkages for high-value care.** *New England Journal of Medicine* 2014, **371:**2148-2150.
12. English KC: **Intermediate outcomes of a tribal community public health infrastructure assessment.** *Ethnicity and Disease* 2004, **14:**S1-61.
13. Kim C: **Recruitment and retention in the Navajo Area Indian Health Service.** *Western Journal of Medicine* 2000, **173:**240.
14. **American Indian and Alaska Native Heart Disease and Stroke Fact Sheet** [https://www.cdc.gov/dhdsp/data_statistics/fact_sheets/fs_aian.html]
15. **Native Americans with Diabetes** [https://www.cdc.gov/vitalsigns/aian-diabetes/]
16. **Diné Food Sovereignty: A Report on the Navajo Naton Food System and the Case to Rebuild a Self-sufficient Food System for the Diné People** [http://www.dinecollege.edu/institutes/DPI/Docs/dpi-food-sovereignty-report.pdf]
17. **Navajo Nation Mortality Report, 2006 - 2009. Navajo Mortality Report New Mexico Portion, 2010 - 2013** [www.nec.navajo-nsn.gov]
18. **Presentation by Mae-Gilene Begay, Program Director to Arizona Advisory Council on Indian Healthcare.** (Navajo Nation Community Health and Outreach Program NDoH ed.; 2018.
19. King C GA, Gampa V, Smith C, Muskett O, Brown C, Malone J, Sehn H, Curley C,

Begay MG, Nelson AK, Shin SS: **Strengthening the role of Community Health Representatives in the Navajo Nation.** *BMC Public Health* 2017, **17:**348.

20. Strauss A CJ: *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory.* 2nd ed edn: Thousand Oaks: Sage Publications, Inc.; 1998.
21. Dedoose: **Dedoose Version 7.0.23, web application for managing, analyzing, and presenting qualitative and mixed method research data.** (SocioCultural Research Consultants Lwdc ed. Los Angeles, CA; 2016.
22. Shah M HM, Davis M.: **Community Health Workers and the Patient Protection and Affordable Care Act: An opportunity for a research, advocacy, and policy agenda.** *Journal of health care for the poor and underserved* 2014, **25:**17-24.
23. Otero-Sabogal R AD, Siebold S, Hallen E, Lee R, Ketchel A, Li J, Newman J.: **Physician-community health worker partnering to support diabetes self-management in primary care.** *Qual Prim Care* 2010, **18:**363-372.
24. Bodenheimer T SC: **From Triple to Quadruple Aim: Care of the Patient Requires Care of the Provider.** *Annals of Family Medicine* 2014, **12:**573-576.
25. Furukawa MF KJ, Patel V, Hsiao CJ, Adler-Milstein J, Jha AK.: **Despite substantial progress In EHR adoption, health information exchange and patient engagement remain low in office settings.** *Health Affairs* 2014, **33:**1672-1679.

Supplement: Interview Guide Used as a Part of Provider Interviews

How did you start working with COPE? (Variations: what motivated you to work with COPE, how did you hear about COPE, etc.? Introduced to COPE through a CHR or provider?)

What are some ways in which you interact with COPE? (Case management? education? training?)

In terms of working with COPE, what works well in your Service Unit? What could be improved? Do teams collaborate well?

Are there challenges in your Service Unit you feel like COPE could play a greater role or assist in addressing?

What are some challenges in implementing COPE in your Service Unit? What can be done to improve collaboration with COPE at SU? (ex. Management challenges)

Has COPE impacted communication/collaboration within your Service Unit? (Probe: clinic settings? community settings?) Do you believe that the collaboration has impacted patients' health outcomes? (If so, how?)

Do you feel that COPE has impacted your work day-to-day? (If so, how?)

Do you refer patients? How do you decide if you will refer a patient to COPE?

Can you describe a typical interaction with COPE patients? Is it different from interactions with non-COPE patients (Probe: clinic visit, home visit, education sessions?)

Can you describe a typical case management meeting?

If you do not have case management in your Service Unit, do you think it would be useful to? What are the barriers?

*How does food access impact patient health in your service unit? **

*Do you use holistic medicine, traditional medicine, or traditional teachings in your practice? **

These questions were added to the analysis as part of a request from the COPE Community Health Advisory Panel.

COREQ (COnsolidated criteria for REporting Qualitative research) Checklist

A checklist of items that should be included in reports of qualitative research. You must report the page number in your manuscript where you consider each of the items listed in this checklist. If you have not included this information, either revise your manuscript accordingly before submitting or note N/A.

Topic	Item No.	Guide Questions/Description	Reported on Page No.
Domain 1: Research team and reflexivity			
Personal characteristics			
Interviewer/facilitator	1	Which author/s conducted the interview or focus group?	6
Credentials	2	What were the researcher's credentials? E.g. PhD, MD	6
Occupation	3	What was their occupation at the time of the study?	6
Gender	4	Was the researcher male or female?	6
Experience and training	5	What experience or training did the researcher have?	6
Relationship with participants			
Relationship established	6	Was a relationship established prior to study commencement?	6
Participant knowledge of the interviewer	7	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research	6, 14
Interviewer characteristics	8	What characteristics were reported about the inter viewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic	6, 14
Domain 2: Study design			
Theoretical framework			
Methodological orientation and Theory	9	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis	6
Participant selection			
Sampling	10	How were participants selected? e.g. purposive, convenience, consecutive, snowball	6
Method of approach	11	How were participants approached? e.g. face-to-face, telephone, mail, email	6
Sample size	12	How many participants were in the study?	7
Non-participation	13	How many people refused to participate or dropped out? Reasons?	N/A
Setting			
Setting of data collection	14	Where was the data collected? e.g. home, clinic, workplace	6
Presence of non-participants	15	Was anyone else present besides the participants and researchers?	6
Description of sample	16	What are the important characteristics of the sample? e.g. demographic data, date	6, 18
Data collection			
Interview guide	17	Were questions, prompts, guides provided by the authors? Was it pilot tested?	6
Repeat interviews	18	Were repeat inter views carried out? If yes, how many?	N/A
Audio/visual recording	19	Did the research use audio or visual recording to collect the data?	6
Field notes	20	Were field notes made during and/or after the inter view or focus group?	6
Duration	21	What was the duration of the inter views or focus group?	6
Data saturation	22	Was data saturation discussed?	6
Transcripts returned	23	Were transcripts returned to participants for comment and/or	6

Topic	Item No.	Guide Questions/Description	Reported on Page No.
		correction?	
Domain 3: analysis and findings			
Data analysis			
Number of data coders	24	How many data coders coded the data?	6-7
Description of the coding tree	25	Did authors provide a description of the coding tree?	6-7
Derivation of themes	26	Were themes identified in advance or derived from the data?	6-7
Software	27	What software, if applicable, was used to manage the data?	6
Participant checking	28	Did participants provide feedback on the findings?	6
Reporting			
Quotations presented	29	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g. participant number	7-14
Data and findings consistent	30	Was there consistency between the data presented and the findings?	7-14
Clarity of major themes	31	Were major themes clearly presented in the findings?	7-14
Clarity of minor themes	32	Is there a description of diverse cases or discussion of minor themes?	7-14

Developed from: Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care*. 2007. Volume 19, Number 6: pp. 349 – 357

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BMJ Open

Community-Clinic Linkages: Qualitative Provider Perspectives on Partnering with Community Health Representatives in Navajo Nation

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Title: Community-Clinic Linkages: Qualitative Provider Perspectives on Partnering with Community Health Representatives in Navajo Nation

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Abstract

Objective: To understand providers' opinions about the Community Outreach and Patient Empowerment (COPE) Project designed to strengthen Navajo Community Health Representative (CHR) outreach to individuals living with diabetes.

Design: This was a prospective, qualitative study nested within a larger evaluation of a program intervention.

Setting: The study took place in Navajo Nation and evaluated a program initiative designed to strengthen collaboration between CHRs and clinic-based healthcare providers and provide structured outreach to individuals living with diabetes in Navajo Nation. CHRs are a formal community health worker program that exists most tribal healthcare systems across the United States.

Participants: 13 healthcare providers took part in qualitative interviews.

Analysis: A team of three study staff used open-coding to create a codebook. Discrepancies were discussed and finalized based on group consensus. Coded material were summarized and patterns were identified and tied into a narrative using concept mapping.

Results: Providers (n=10) acknowledged CHRs as an asset to the clinical team. Providers (n=8) were enthusiastic about the COPE coaching materials, mentioning they provided a consistent message to CHRs and the community. Providers that led COPE trainings with CHRs valued the face-to-face time and opportunity to build relationships. Providers (n=4) supported CHRs' access to EHR to record patient visits and streamline referrals. Among their requests were having designated personnel to manage referrals with CHRs and a formal system to record modules CHRs have completed.

Conclusion: Providers participating in COPE activities valued the work of CHRs and endorsed further strengthening relationships and communication with CHRs. Healthcare programs should consider systems changes to integrate community health workers into clinic-based teams.

Article Summary:

Strengths and Limitations:

- Qualitative data presents first-hand information regarding the provider experience in a community-clinic linkage program.
- Active participation throughout the study by a Community Health Advisory Panel enriched the interview questions and interpretation of findings.
- Although saturation was obtained, the total number of participants was small and limited to providers who were involved in COPE.

Background:

In resource-poor communities, access to health care services is often inadequate. In these settings, Community Health Workers (CHWs) are healthcare professionals who can link patients to clinical facilities thereby improving patient health outcomes [1, 2]. One key strength of CHWs is that they represent the communities that they serve and thus deliver outreach in a culturally appropriate manner [3, 4].

Although serving a vital role in connecting patients to the healthcare system, research has shown that CHWs have largely been structurally excluded from major aspects of the healthcare system, including clear roles and workflows within care teams, participation in team meetings, and access to electronic health records [5, 6]. Conversely, when CHWs are integrated into the healthcare system, they are effective at improving healthcare outcomes for patients [7-9]. Effective integration of CHWs into the care team allows CHWs to share vital perspectives of the home environment to clinic-based healthcare providers who may have little or no insight into patient's living situation and psychosocial surroundings. By expanding community-clinic linkages and connecting CHWs with the healthcare system, CHWs are better able to support both the patients and providers in forming an effective patient-centered care team [7, 10].

In many tribal communities, Community Health Representatives (CHRs) are a long-standing workforce of community health workers who provide culturally-sensitive outreach to families living in vastly rural communities [11]. Because CHRs are typically operated as tribal programs and healthcare services are often delivered through the federal Indian Health Services, coordination between CHRs and clinical providers may be limited. In an effort to integrate CHRs with local clinic-based teams, a collaboration among the Navajo CHR Program, Navajo Area Indian Health Services (NAIHS), and Brigham and Women's Hospital was established in 2009. The goal of this initiative, called Community Outreach and Patient Empowerment or COPE, was to integrate CHRs with healthcare teams.

Evaluation efforts have sought to understand how COPE impacts clinical and health systems outcomes, as well as diverse stakeholder perspectives including CHRs, clinic-based providers, and patients themselves. The impact on CHR-provider communication and clinical outcomes have been described elsewhere [12]. Nonetheless, sustainable improvements in health system performance rely on a shared sense of the systems to be improved, deeply engaged staff, and ongoing feedback systems [13]. To inform ongoing program improvement and understand potential for this program as a lasting and integrated component of the local healthcare system, we sought to understand the program's impact on the experience of clinic-based healthcare providers. To our knowledge, this is the first study to explore the provider reported perspective and recommendations towards the utilization and integration of CHWs, including CHRs, into "cross-institutional" healthcare teams [14].

Methods:

Study Setting

The Navajo Nation is a federally recognized American Indian tribe in the United States covering regions of Arizona, New Mexico and Utah. Similar to other communities with few economic resources within the United States, the Navajo Nation lacks the infrastructure to allow for consistent access to quality health care. This largely stems from rural nature of the reservation, which has unpaved roads, long distances from patients' homes to healthcare centers, and a high degree of provider turnover within the healthcare facilities [15, 16].

Partially due to these inequities, diabetes and cardiovascular disease stand as some of the leading causes of death within American Indian and Alaskan Native communities within the United States [17, 18]. It has been estimated that roughly 25,000 Navajos have diabetes (around 21.5% of the adult population), and another 75,000 have been diagnosed with prediabetes [19]. Among Navajo people, cardiovascular disease and diabetes represent the third and fourth leading causes of death, respectively [20].

The Navajo Nation is divided up in to separate local governances called "chapters". These chapters are grouped geographically and represented by eight Service Units within the NAIHS. Each Service Unit has a health facility, sometimes with several satellite clinics.

Within the Navajo Department of Health, the Navajo CHR Program employs approximately 141 staff, including 99 CHRs, within the CHR, Tuberculosis and Sexually Transmitted Disease Prevention Programs [21]. Navajo CHRs are required to be trained as a Certified Nursing Assistant (CNA) and must speak Navajo. Many CHRs have additionally obtained certification and credentialing beyond the CNA required for the job, including CHW Certification through the state of New Mexico [22]. Typical services provided by Navajo CHRs include home visits to monitor vital signs and provide health education, referrals for additional services and resources needed by their client, community outreach for urgent or emergent issues, and health fairs and other health promotion activities. Each CHR is assigned to one or two chapters (usually where they themselves live). A CHR office is usually provided by the community within the Chapter House. CHR teams are organized by Service Units, with a team office typically located close to the service unit's main healthcare facility.

COPE Intervention

The COPE intervention consists of three main strategies: creating systems for referral, coordination and communication between CHRs and clinic-based providers; providing high-quality training to CHRs on health topics and motivational interviewing; and developing standardized outreach materials for CHRs to use with patients living with diabetes [4]. This intervention was delivered under program auspices; thus, the research to evaluate COPE's impact was observational in nature.

The partnership began when staff from the Division of Global Health Equity at the Brigham and Women's Hospital were invited to collaborate with Navajo Area Indian Health Services and the Navajo Nation CHR, specifically to bring technical assistance and tools developed from international programs in which community health workers have been successfully integrated into large-scale public health systems [23]. Initially, COPE Project staff met with the Navajo CHRs to determine what additional tools COPE could provide to increase the level of patient care for the CHRs. CHRs stated that a standardized set of patient teaching materials would be the most important aspect to improve their health care delivery on the Navajo Nation. COPE staff worked with CHRs and health care providers to develop culturally-specific health education materials in the form of flipcharts.

COPE staff then facilitated monthly trainings on these health education materials at all eight Service Units. For each training, the COPE team invites a local healthcare provider to deliver the training on their specialty or area of interest and provides the training materials (learning objectives, materials, competency assessment) to the trainer in advance. CHRs complete pre- and post-competency assessments, and both CHRs and trainers complete a feedback form to evaluate their satisfaction with the event and seek further suggestions for improvement. CHRs who receive a passing score (≥ 70%) on their post-competency assessment are then given the flipchart to use with their patients; if they do not pass, COPE staff schedule a follow-up one-on-one training to review materials and re-administer the competency assessment.

Other concerted efforts of the COPE Program included initiating case management meetings between CHRs and providers and establishing access for the CHRs in the Electronic Health Record (EHR) used by most Indian Health Service facilities. Nationally, CHWs have faced barriers documenting their patient encounters and communicating their observations to clinic providers. When COPE began, CHRs did not have access to the EHR. As a result of the COPE Program and supportive clinic providers, two of the Service Units were able to grant CHRs access to EHR. CHRs in those service units underwent HIPAA and information security training prior to gaining access to the electronic systems. Specific templates were created for providers to make referrals to CHRs and for CHRs to document their home visits. Improvements in communication were shown as a result of this system change [22].

Study Population

Providers were included in this study if they had previous experience or involvement with the COPE Program. Roles of COPE involvement by providers varied greatly from leading CHR training, facilitating meetings between clinic staff and CHRs, and referring patients to the CHR program.

Study Design

This was a qualitative study embedded within a broader observational study designed to evaluate the impact of the COPE intervention. COPE research staff approached healthcare providers via phone, email or in person to ask if they would be willing to participate in the study. For those providers who agreed to be interviewed, one of three trained study staff conducted the in-depth interviews lasting 15-35 minutes (CB, AL, and CK). Interviews were conducted in English, either in person in clinic or by phone. They were transcribed verbatim by a note taker or digitally recorded and then subsequently transcribed. Transcripts were not reviewed by interviewers. Sampling ended when saturation was achieved. The study team determined that saturation was achieved when no new information about the impact of the COPE Program on provider care surfaced after three interviews.

Research Team

The research team consists of one non-Navajo, female Physician who is also the study's Principle Investigator and organization's Executive Director (SShin, MD, MPH degree); five young male and female researchers working as either interns or study coordinators (CB, AL, CK, CC, and SSalt), all with BA's, and three of which are Navajo (CB, CC and SSalt); one Navajo, female Community Outreach Manager at COPE, who has also worked as a CHR (OM), one non-Navajo, female Clinical Applications Coordinator at Navajo Area Indian Health Services (KR, CNM degree), the Navajo female Program Director of the Navajo CHR & Outreach Program

(MGB, MSW degree), and one non-Navajo female Qualitative Researcher/ Research Manager employed at Brigham and Women's Hospital and stationed at COPE (AKN, MPH, Msc degree). SShin has worked for twenty years as a researcher dedicated to community health interventions for patients with tuberculosis and HIV at Partners In Health sites including Haiti, Peru, and Russia and has led COPE since 2009. AKN has been working with Partners In Health as a Research Assistant and Qualtiative Researcher for nine years. MGB has been the Program Director for the Navajo CHR/ Outreach Program for eighteen years.

Patient and Public Involvement

The study was carried out using Community Based Participatory Methods, with ongoing input from a Community Health Advisory Panel (CHAP) comprised of patients and CHRs. The CHAP met quarterly. Prior to the study initiation, the CHAP provided feedback to define the overall study objectives, and specifically. Endorse this qualitative study of provider perspectives. The CHAP provided feedback on Research study staff developed the qualitative interview guide, with feedback from our Community Health Advisory Panel (CHAP) comprised of patients and CHRs. The CHAP was involved throughout the study, during quarterly meetings in which the study team presented aspects of the study (e.g. interview guide, sampling plan, preliminary findings, manuscript draft) and sought feedback through facilitated small group sessions. As an example, the provider interview guide was designed by study staff to understand the provider's experience working with CHRs and also specifically interacting with the COPE intervention. The interview guide was then presented and reviewed by CHAP, which is comprised of Navajo CHRs, patients, and the family members of patients. The goal of this review was to ensure the research and interview guide was culturally-informed and would elicit information of interest to patients and family members. Upon review, the CHAP recommended adding two questions that focused on food access and traditional/holistic medicine. The final interview guide is included in **[Supplement].** CHAP also provided feedback on the study findings, to ensure that interpretation of findings were consistent with their own perspectives as CHRs and patients. The public was also involved in the study, by obtaining initial approval from Tribal Agency Councils and Health Boards, and by formally presenting results to these same groups at the end of the study.

Data Analyses

Thematic analysis was used to analyze qualitative data [24]. All transcriptions were de-identified and uploaded into the Dedoose software [25]. Themes were not determined in advance, rather they emerged from the interview data. A team of a qualitative researcher (AKN) and two research assistants (CB, AL) coded interviews using open coding. First, codes were identified by the study team, and then clustered based on team discussion into broader themes. Four themes emerged which made up the final codebook: general interaction with COPE, implementation of COPE within the service unit, the impact of COPE, and improvement of COPE and related activities. Interviews were then reviewed again by the same team and coded independently. Inter-rater reliability was tested and kappa scores of 0.49, 0.49, 0.46 were achieved. Discrepancies in coding were discussed with a qualitative researcher and finalized based on group discussion. A brief synopsis for each code was them generated, describing the number of respondents endorsing each code, as well as patterns of concordance and contrasts among respondents. These findings were then unified into a narrative using concept mapping. When organized by theme, the narrative was somewhat redundant; therefore, the team chose to organize the narrative into three cross-cutting topics, which emerged as the most salient program features based on provider responses. To further assess validity of coded results, findings were triangulated with field observation among COPE staff as well as CHAP feedback.

Choice of terminology

In this study, the study team decided to use the term CHR (Community Health Representative) instead of CHW (Community Health Worker) which is a broader term inclusive of CHRs. Navajo CHRs refer to the community members that they work with as clients rather than patients; for this reason, we use the term "clients" although providers may refer to the same individuals as "patients."

The term providers used throughout this paper is intended to be encompassing of multiple different hospital staff that have direct contact with patients. Examples of providers interviewed range from doctors, nurses, public health nurses, CHR supervisors.

The term community-clinic linkages refers to relationships between clinical provider teams and community-based resources to improve delivery of care and health outcomes through greater communication and collaboration across three key stakeholders – the clinic/clinician, the patient, and the community resource [26, 27].

Ethical considerations

The Ethics Committee of Partners Healthcare and the Navajo Nation Human Research Review Board approved the study. All participants signed a consent to participate in this study.

Results:

A total of thirteen providers from five service units were interviewed [**Table 1**]. Five interviews took place by phone and eight in-person at the interviewee's worksite. Findings related to three major aspects of the program: acknowledging the importance of community-clinic linkages, endorsement of COPE training and materials, and an appreciation for CHR access to electronic health records.

Acknowledging the Importance of Community-Clinic Linkages

Overall, most providers (10) explicitly acknowledged the importance of the CHR role and described CHRs as a "big interface to allow the community to interact with the hospitals." Providers acknowledged the unique value of CHRs' outreach work, knowledge in health education and management, knowledge of community/resources, and ability to see patients in their own living environment. Through COPE interactions, providers gained a deeper appreciation of the role of CHR.

[Due to COPE], there is a closer interaction that we have with the CHRs because we both serve the same population of people. They're able to do the outreach piece of it, more so than we are. Yes, a closer interaction with the CHRs to help bridge the gap where we can't meet the patient out in the communities per se.

\- *Catherine, Nurse Practitioner*

We were pounding home [to the CHRs]: "You're the ones who have eyes and ears on these people, you're very valuable." And over a period of time, they started understanding that they were an asset, that they had things to offer that no doctor, very, very few nurses, would understand, because they were in the home. They can see things that we would never see.

- Kate, Diabetes Educator

Nonetheless, almost all providers felt that there was a need for increased formalized collaboration, specifically in the form of an interdisciplinary team. Multiple providers suggested increased face-to-face collaboration through the creation of formalized multidisciplinary health teams, regular inter-professional meetings consisting of PHNs, CHRs, clinicians, nurses, and diabetes educators. *"Arranging actual meetings, physical meetings"* to learn about respective programs could also increase an understanding of how programs could work together. One provider expressed concern that CHRs are hard to get to know since they are not based at the hospital.

It'd be great if we could get to know certain CHRs better, so we could really maintain communication with them, and they would feel more comfortable talking to us… Just being able to get to know the CHRs better, I think would increase communication, and have them be more comfortable talking to me, calling me about patients, that would really change up some of the ways that we practice. *- Andrew, Physician*

[It] would be great for them to meet with the diabetes educators… Some of the requests for teaching the CHRs, it'd probably great for the diabetes educators to help because they're RN-level providers, so they could actually help with a lot of the diabetes education with the CHRs… [There are] a lot of ways that we could all kind of work together better. *- Janet, Physician*

Providers cited case management as a formalized way that many service units currently arrange for different fields to come together to discuss patient care. While more than half of the providers reported ongoing case management teams in their service unit, they described mixed feelings toward case management. While some providers (3/6 who had case management at their facility) felt that case management was useful and worth the time investment, others (2) expressed skepticism because they felt it was unnecessary or time-consuming. Providers indicated that barriers to successful case management programs included high provider turnover, short staffing, and lack of time or inflexibility in schedules.

They had never used case managers here in the diabetes program before…. So I brought the concept of case management to the table, and our CHRs began to identify some of their problem clients in the community. And we would have complex care case management meetings with the public health nurse, the doctor, all the family members, and tried to get as much clear understanding of what some of the problems or barriers to care were. And, before long the CHRs and the public health nurses began working really, really, really close together. We were just seeing the success of the whole idea, the whole program.

-Kate, Diabetes Educator

[Would case management be useful?] It just depends on the patient and how much time people have to do meetings. I know PHN do, but I usually don't have time. For me it's better if I do individual follow up on someone I've referred. *– Rosita, Diabetes Educator*

Lastly, many providers mentioned their own or their colleagues' lack of awareness of the COPE Project. Because of high provider turnover rates, one provider suggested quarterly meetings with progress updates as "an opportunity to educate the people that have just joined the staff." Providers suggested that increasing awareness and sharing results about COPE could increase referrals and reach more beneficiaries.

As a clinician, I want to know outcomes. If someone is going to take the CHRs' time and resources, to send them to a place to do this, I want to know that it works, you know?
- Abigail, Physician

If we were more aware of [CHRs], we probably could reach out to them more and utilize them more and they could utilize us more too. *- Janet, Physician*

If… we could collaborate more it would benefit the patient population that we work with. There's many people that could be seen, and I think that sometimes, because of the overwhelming numbers, not as many patients get touched because we don't even think about referring.
- Tonya, Diabetes Specialist

Endorsement of COPE training and materials

Eight of the providers felt that the health education materials and trainings provided by the COPE Program helped to foster collaboration with CHRs by increasing message consistency. Most providers recognized the "COPE Flipcharts" as a powerful health education resource for CHRs, patients, and the clinics. Providers reported the large variety of topics and use of visuals in the COPE health education materials were thought to be helpful in relaying information.

There's a lot of health topics that they've covered. When I see their monthly [training] activity, there's a lot of topics, using the flipchart and having a resource available that they can use.
- Rosita, Diabetes Educator

Making the modules, the little flipcharts, I think that's a good idea for staff to have. They pull it out for a topic, and I know it's consistent with what we teach.… and I know that they're competent to teach what they're teaching. That makes a big difference.
- Harriett, CHR Supervisor

Interestingly, by increasing the consistency of the information taught by both clinical and homecare teams, the health education materials also built trust and confidence in the CHRs among providers and patients. Many providers felt that having provider-led trainings aided in delivering a consistent message to CHRs, and ultimately to the patients.

Through bolstering the education that the community health workers receive, I think it's making sure what their story is matched by what the patients receive in the hospital as well. We've always had a disconnect, historically… In other words, the community health worker might tell the patient one thing, and then the patients receives completely different information in the hospital, and now the patient doesn't trust anybody. And now,… the patient has trust because they're hearing the same information because the community health worker is now educated, and COPE has been that bridge.

- *Charlene, Nurse Midwife*

Having the providers, the primary care providers, participate in education with the CHRs, I think, is really important because that way the providers are more likely to refer to the program because the providers have the confidence… about the types of information the CHRs are going to provide and their knowledge base.

- *Janet, Physician*

Providers felt that educational materials could be further used to reach a broader audience. While providers reported feeling that both the educational materials and flipcharts were helpful, some providers felt that the materials were currently underutilized and that it would be helpful to record which CHRs had received training in which modules. One provider noted the challenges around discussing difficult topics, such as alcohol use. This provider suggested the "COPE Flipcharts" could provide CHRs with more confidence in addressing these topics and patients could be more receptive.

The education is something that works well. I do think that more patients could benefit from the education that COPE is providing.

- *Tonya, Diabetes Specialist*

The majority (n = 8) of providers interviewed indicated they had delivered at least one CHR training, using COPE materials. Providers stated that the trainings ultimately increased face-to-face time between providers and CHRs. During these interactions, the providers felt they were also able to directly address CHR concerns and questions.

It was nice that COPE has started to invite the providers to give some of those teaching sessions, because that way we can make sure the message the CHRs are delivering is in line with the same message that like we deliver to patients when they come to their clinic visit.

- *Janet, Physician*

My one interaction was them face to face has been with the talk I gave. I was able to address some concerns that they had.

- *Gerry, Public Health Nurse*

Providers indicated, however, a lack of clarity around which CHRs were trained in which COPE modules (topics) and how they were using the flipcharts in the homes. Providers stated that knowing what topics the CHRs were trained to deliver could help them identify the best patients for referral and request specific health education topics for individual patients. One provider suggested possible regular updates on recent CHR trainings.

I think they have all the materials, kind of like resources, but I don't know how [they] actually use them. I don't actually know if they go through the whole curriculum…

Charlene, Nurse Midwife

CHRs access to Electronic Health Records

Ten of the providers supported systems to improve communication with the CHR team, and four specifically endorsed CHR integration into EHR to record patient visits and streamline referrals, regardless of whether their service unit currently had this system in place.

Two providers from a service unit where CHRs had access to EHR reported they were aware that CHRs in their service unit had access to the EHR. These providers stated that their ability to send referrals to CHRs through the EHR has been valuable in seeing CHR notes with ease. Providers also felt the EHR helped to close the feedback loop between their practice in the clinic and the CHR's combined community outreach and public health education. They then acknowledged that this increased the ability for CHR-provider interaction and enabled providers and CHRs to collaborate more easily. Providers reported they used the EHR to share information about their patients with the CHRs. In some cases, providers reported that they would modify their care plan based on critical data provided in the CHR notes. Overall, providers reported that the feedback from the CHR through the EHR system was both useful and appreciated.

When I see the patient and I kind of look through their chart, and I see that the CHRs left a note, I will say, "I hear that one of our CHRs came out to visit you, they were mentioning this that and the other, I'm concerned about that."… and then sometimes, if that means that I need to see the patient sooner, , I might try to schedule the patient sooner."

- *Andrew, Physician, site with CHR access to EHR*

In contrast, providers who worked in service units without access to EHR reported difficulty in locating CHR documentation and receiving feedback from their referrals to the CHRs. Providers stated that they felt CHR's paper records from their home visits were cumbersome to read and providers eventually stopped requesting them. They also described frustration when they failed to hear back from the CHR after making a referral due to limited follow-up communication. They felt that they could not determine whether the patient was successfully visited or enrolled in the CHR's care, nor discern what occurred at these visits.

"There are challenges because we don't share EHR electronic notes. So we don't always get a chance to see what is being done with that CHR and patient in the community. I mean they do a note, and it probably goes in the [paper] chart, but … if it's not in EHR, I really don't pull a chart unless I absolutely have to."

- *Catherine, Nurse Practitioner, no EHR access*

When I put in a referral, I don't get notified…. Sometimes I don't get any feedback in terms of what was the outcome of the [CHR] visit, [or] if there was any interaction done at all with some of the patients.

- *Gerry, Public Health Nurse, no CHR access to EHR*

Providers at sites where CHRs did not have access to the EHR endorsed the prospect of granting CHRs access to EHR in the future. One provider stated that receiving feedback from CHRs via EHR would encourage providers to continue referring patients to the CHRs because they would be able to see the results of their referral and further incorporate the CHR notes into their patient's treatment plan.

Getting those EHR notifications, I think it is really helpful because if you refer to a program but you never get any feedback on how your patients are doing, or what's happening, it's kind of discouraging and people often won't continue to refer if that's the case. So, I think like getting some sort of feedback about what interventions are performed with the patient, how their doing, things like that really encourage the providers to continue to refer.

- *Janet, Physician, Service Unit with no EHR access*

Discussion:

Three main themes emerged from the perspectives of the providers: an acknowledgement of the importance in developing clinic-community linkages, an endorsement of the COPE materials being delivered by the CHRs, and the necessity for CHRs to be integrated into the EHR. The themes that emerged are similar to other situations on a national level where health care providers grapple with a further integration of CHWs into clinical care teams [10, 28]. Although difficult, other studies have shown positive outcomes from this integration [29]. The remarks from providers in this qualitative study works to support the current literature on this subject and encourages integration of the "quadruple aim" – that of improving provider satisfaction – alongside the standard triple aim of enhancing patient experience, improving population health, and reducing costs [30]. One recommendation to address provider satisfaction is creating healthy "care teams" including expanded roles that allow delivery of preventive care and health coaching to patients. The importance of achieving a sense of joy and self-efficacy among healthcare providers highlights the challenges of staff burnout, particularly in settings where staff turnover and workload is high.

Providers recognized the critical role of the CHRs in the healthcare team and felt that increased interactions (e.g. informational exchanges, inter-professional meetings including case management, and quarterly progress updates) would strengthening the relationship between CHRs in the field and providers in the clinic.

Almost all the providers interviewed responded positively to the COPE materials and the quality of the health education that CHRs were delivering in their communities. By involving local providers in the development of educational materials and delivery of training, providers had confidence in the materials and felt reassured that information provided by CHRs would be consistent with what patients were being told in clinic. We felt that this was one of the strongest aspects of the intervention. Provider-led trainings increased collaboration with CHRs by building trusting relationships and stimulating greater collaboration.

Our findings support the need to integrate CHRs through shared access to the Electronic Health Record. EHR access has provided a quick and streamlined process to refer patients to CHRs and critical sharing of important information that improved providers' ability to care for their patients. As healthcare systems move increasingly toward paperless systems, providers rarely review hand-written notes by CHRs [31]. This provider perspective highlights the importance of advocacy among clinicians to facilitate CHR access to EHR. Across tribal communities, many Indian Health Service sites utilize the same electronic health record system, providing a unique opportunity to utilize training and clearance protocols as well as EHR templates developed in Navajo to any interested site.

Our study has several limitations. Because COPE team members conducted the interviews, providers may not have been as truthful about negative experiences and interviews may have been less comfortable probing for negative feedback. On the other hand, the interview guide included questions explicitly asking about implementation challenges and opportunities for improvement. We feel that providers were honest about their experiences with the COPE Program, the Navajo Area IHS System, and the Navajo Nation CHR Program based on their wide range of responses including frank discussion of challenges in the program. All of the providers that were interviewed as a part of this study had some relationship to the COPE Program, and were therefore more likely to be advocates for the program and for CHRs in general. We recognized that these responses do not necessarily reflect perspectives among all providers across these healthcare facilities. While not the scope of this study, interviewing providers not involved with COPE could have provided a more accurate reflection of the general population of providers, as well as insight on how to involve more providers. In fact, those who participated in this study felt that more providers should be aware of this program and the role of CHRs. They suggested that the materials could be used to provide health coaching to more patients, and also emphasized the need to increase awareness of CHRs and the COPE intervention among the broader community of clinic-based providers.

Conclusion:

Providers who worked with CHRs and the COPE intervention expressed a strong appreciation for the unique role of CHRs and the value of COPE's standardized health education materials and CHR trainings. At a system level, providers were able to work more closely with CHRs when they shared access to Electronic Health Records. Successful integration of community health workers into interprofessional healthcare teams may inform CHW programs across a variety of settings. Further research to better understand the patient experience would complement the provider perspective to determine whether and how integration of CHWs into healthcare teams also improves the patient experience of care.

Declarations:

Ethics:

The Ethics Committee of Partners Healthcare and the Navajo Nation Human Research Review Board approved the study. All participants signed a consent to participate in this study.

Consent for Publication:

All study participants provided informed consent for their data to be used in research and publication.

Availability of data and materials:

All research data is property of the Navajo Nation as per Navajo Human Research Review Board (NHRRB) protocols. Investigators who seek to use this data would need to request permission from the NHRRB and provide reassurance that their request is consistent with applicable privacy, confidentiality and other legal requirements.

Competing Interests:

Dr. Sonya Shin discloses that she has served as the Executive Director for a 501(c)3 organization, entitled Community Outreach and Patient Empowerment Program which continues to support the described program, since study completion.

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The Navajo Nation Human Research Review Board as well as the Partners Institutional Review Board reviewed and approved the study protocol. All results have been presented to the Navajo Nation Human Research Review Board (Protocol #NNR-11.150).

Author contributions:

CB led the qualitative analysis team as a junior investigator. He coded interviews, conducted analysis, and drafted all sections of the manuscript.

AL was part of the analysis team and helped conduct and code interviews, conduct analysis, and edit the final manuscript.

CC was part of the analysis team and helped to code interviews, conduct analysis, and edit the final manuscript.

CK conducted and transcribed interviews and provided edits on the final manuscript.

OM was part of the analysis team and provided input on the results and final manuscript. She is a Navajo researcher with experience working as a CHR.

SS was part of the analysis team and helped to code interviews, conduct analysis, and edit the final manuscript.

KR works for IHS and is involved in the design, maintenance, and advocacy for the use of the EHR across all Navajo health sites. She provided feedback about the EHR and its function within the Navajo health facilities during data collection and analysis and edited the final manuscript.

MGB is the Program Director of the Navajo Nation Community Health Representative and Outreach Program. She provided feedback during the design of the study, data analysis, and edited the final manuscript.
AKN is a qualitative researcher. She guided the team in the methods of designing the study and conducting data analysis, incorporated edits from all authors. She provided a qualitative methods perspective to the final manuscript.
SS is the PI for this study. She guided the team in the design of this qualitative study and provided high level support in the analysis and drafting of the manuscript. She provided clinical perspective on the findings.

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Table 1. Occupation and Number of Participants*

Job Title	**Number of Participants**
Physician	5
Diabetes educator / specialist	4
Case Manager	1
Registered Nurse	5
Public Health Nurse	3
Nurse Practioner	1
Nurse Midwife	1
CHR Supervisor	1

*Note: Some participants have more than one title. Quotes are not linked with specific Service Units or job titles in order to protect participants' confidentiality.

References:

1. Brown HS 3rd WK, Pagán JA, Arcari CM, Martinez M, Smith K, Reininger B. : **Cost-effectiveness analysis of a community health worker intervention for low-income Hispanic adults with diabetes**. *Prev Chronic Dis* 2012, **9**.
2. Condo J: **Rwanda's evolving community health worker system: a qualitative assessment of client and provider perspectives**. *Human resources for health* 2014, **12**(1).
3. Pérez LM MJ: **Community Health Workers: Social Justice and Policy Advocates for Community Health and Well-Being**. *American Journal of Public Health* 2008, **98**(1):11-14.
4. Gampa V, Smith, C., Muskett, O., King, C., Sehn, H., Malone, J., Curley, C., Brown, C., Begay, M.G., Shin, S., Nelson, A. K.: **Cultural elements underlying the community health representative – client relationship on Navajo Nation**. *BMC Health Services Research* 2017, **17**(19).
5. Kangovi S, Grande, D., Trinh-Shevrin, C.: **From rhetoric to reality--community health workers in post-reform U.S. health care**. *New England Journal of Medicine* 2015, **372**(24):2277-2279.
6. Allen CG, Escoffery, C., Satsangi, A., Brownstein, J.N.: **Strategies to Improve the Integration of Community Health Workers Into Health Care Teams: "A Little Fish in a Big Pond"**. *Preventive Chronic Disease* 2015, **17**(12).
7. Allen CG: **Strategies to Improve the Integration of Community Health Workers Into Health Care Teams: "A Little Fish in a Big Pond"**. *Preventing chronic disease* 2015, **12**.
8. Shah M KE, Heisler M.: **The Role of Community Health Workers in Diabetes: Update on Current Literature**. *Current diabetes reports* 2013, **13**(2):163-171.
9. Malcarney MB PP, Quigley L, Horton K, Seiler N.: **The Changing Roles of Community Health Workers**. *Health Serv Res* 2017, **52**(Suppl 1).
10. Findley S MS, Hicks A, Chang J, Reich D.: **Community health worker integration into the health care team accomplishes the triple aim in a patient-centered medical home: a Bronx tale**. *J Ambul Care Manage* 2014, **37**(1):82-91.
11. **Navajo Community Health Representative.** [http://www.nndoh.org/chr.html]
12. Trevisi L, Orav, J., Atwood, S., Brown, C., Curley, C., King, C., Muskett, O., Sehn, H., Nelson, A.K., Begay, M.G., Shin, S.: **Integrating Community Health Representatives with Health Care Systems: The Impact on Clinical Outcomes in Navajo Nation**. In: *American Public Health Association Annual Meeting: November 4-8 2017; Atlanta, GE*; 2017.
13. **Getting Started Kit: Rapid Response Teams** [www.ihi.org]
14. Sequist TD, and Elsie M. Taveras.: **Clinic–community linkages for high-value care**. *New England Journal of Medicine* 2014, **371**(23):2148-2150.
15. English KC: **Intermediate outcomes of a tribal community public health infrastructure assessment**. *Ethnicity and Disease* 2004, **14**(3):S1-61.
16. Kim C: **Recruitment and retention in the Navajo Area Indian Health Service**. *Western Journal of Medicine* 2000, **173**(4):240.
17. **American Indian and Alaska Native Heart Disease and Stroke Fact Sheet** [https://www.cdc.gov/dhdsp/data_statistics/fact_sheets/fs_aian.html]
18. **Native Americans with Diabetes** [https://www.cdc.gov/vitalsigns/aian-diabetes/]

19. **Diné Food Sovereignty: A Report on the Navajo Naton Food System and the Case to Rebuild a Self-sufficient Food System for the Diné People** [http://www.dinecollege.edu/institutes/DPI/Docs/dpi-food-sovereignty-report.pdf]
20. **Navajo Nation Mortality Report, 2006 - 2009. Navajo Mortality Report New Mexico Portion, 2010 - 2013** [www.nec.navajo-nsn.gov]
21. **Presentation by Mae-Gilene Begay, Program Director to Arizona Advisory Council on Indian Healthcare**. In. Edited by Navajo Nation Community Health and Outreach Program NDoH; 2018.
22. King C GA, Gampa V, Smith C, Muskett O, Brown C, Malone J, Sehn H, Curley C, Begay MG, Nelson AK, Shin SS: **Strengthening the role of Community Health Representatives in the Navajo Nation**. *BMC Public Health* 2017, **17**(1):348.
23. Behforouz HL, Farmer, P.E., Mukherjee, J.S.: **From directly observed therapy to accompagnateurs: enhancing AIDS treatment outcomes in Haiti and in Boston**. *Clinical Infectious Disease* 2004, **1**(38):Suppl 5:S429-436.
24. Clarke V, Braun, V., Terry, G., Hayfield N.: **Thematic analysis**. In: *Handbook of research methods in health and social sciences.* edn. Edited by Liamputtong P. Singapore: Springer; 2019: 843-860.
25. Dedoose: **Dedoose Version 7.0.23, web application for managing, analyzing, and presenting qualitative and mixed method research data**. In. Edited by SocioCultural Research Consultants Lwdc. Los Angeles, CA; 2016.
26. **Community-Clinical Linkages for the Prevention and Control of Chronic Diseases: A Practitioner's Guide**. In. Atlanta, GA: Centers for Disease Control and Prevention, U.S. Department of Health and Human Services; 2016.
27. **Clinical-Community Relationships Evaluation Roadmap** [https://www.ahrq.gov/prevention/resources/chronic-care/clinical-community-relationships-eval-roadmap/index.html]
28. Shah M HM, Davis M.: **Community Health Workers and the Patient Protection and Affordable Care Act: An opportunity for a research, advocacy, and policy agenda**. *Journal of health care for the poor and underserved* 2014, **25**(1):17-24.
29. Otero-Sabogal R AD, Siebold S, Hallen E, Lee R, Ketchel A, Li J, Newman J.: **Physician-community health worker partnering to support diabetes self-management in primary care**. *Qual Prim Care* 2010, **18**(6):363-372.
30. Bodenheimer T SC: **From Triple to Quadruple Aim: Care of the Patient Requires Care of the Provider**. *Annals of Family Medicine* 2014, **12**(6):573-576.
31. Furukawa MF KJ, Patel V, Hsiao CJ, Adler-Milstein J, Jha AK.: **Despite substantial progress In EHR adoption, health information exchange and patient engagement remain low in office settings**. *Health Affairs* 2014, **33**(9):1672-1679.

Supplement: Interview Guide Used as a Part of Provider Interviews

How did you start working with COPE? (Variations: what motivated you to work with COPE, how did you hear about COPE, etc.? Introduced to COPE through a CHR or provider?)

What are some ways in which you interact with COPE? (Case management? education? training?)

In terms of working with COPE, what works well in your Service Unit? What could be improved? Do teams collaborate well?

Are there challenges in your Service Unit you feel like COPE could play a greater role or assist in addressing?

What are some challenges in implementing COPE in your Service Unit? What can be done to improve collaboration with COPE at SU? (ex. Management challenges)

Has COPE impacted communication/collaboration within your Service Unit? (Probe: clinic settings? community settings?) Do you believe that the collaboration has impacted patients' health outcomes? (If so, how?)

Do you feel that COPE has impacted your work day-to-day? (If so, how?)

Do you refer patients? How do you decide if you will refer a patient to COPE?

Can you describe a typical interaction with COPE patients? Is it different from interactions with non-COPE patients (Probe: clinic visit, home visit, education sessions?)

Can you describe a typical case management meeting?

If you do not have case management in your Service Unit, do you think it would be useful to? What are the barriers?

How does food access impact patient health in your service unit? *

Do you use holistic medicine, traditional medicine, or traditional teachings in your practice? *

***These questions were added to the analysis as part of a request from the COPE Community Health Advisory Panel.*

COREQ (COnsolidated criteria for REporting Qualitative research) Checklist

A checklist of items that should be included in reports of qualitative research. You must report the page number in your manuscript where you consider each of the items listed in this checklist. If you have not included this information, either revise your manuscript accordingly before submitting or note N/A.

Topic	Item No.	Guide Questions/Description	Reported on Page No.
Domain 1: Research team and reflexivity			
Personal characteristics			
Interviewer/facilitator	1	Which author/s conducted the interview or focus group?	6
Credentials	2	What were the researcher's credentials? E.g. PhD, MD	6
Occupation	3	What was their occupation at the time of the study?	6
Gender	4	Was the researcher male or female?	6
Experience and training	5	What experience or training did the researcher have?	6
Relationship with participants			
Relationship established	6	Was a relationship established prior to study commencement?	6
Participant knowledge of the interviewer	7	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research	6, 14
Interviewer characteristics	8	What characteristics were reported about the inter viewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic	6, 14
Domain 2: Study design			
Theoretical framework			
Methodological orientation and Theory	9	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis	6
Participant selection			
Sampling	10	How were participants selected? e.g. purposive, convenience, consecutive, snowball	6
Method of approach	11	How were participants approached? e.g. face-to-face, telephone, mail, email	6
Sample size	12	How many participants were in the study?	7
Non-participation	13	How many people refused to participate or dropped out? Reasons?	N/A
Setting			
Setting of data collection	14	Where was the data collected? e.g. home, clinic, workplace	6
Presence of non-participants	15	Was anyone else present besides the participants and researchers?	6
Description of sample	16	What are the important characteristics of the sample? e.g. demographic data, date	6, 18
Data collection			
Interview guide	17	Were questions, prompts, guides provided by the authors? Was it pilot tested?	6
Repeat interviews	18	Were repeat inter views carried out? If yes, how many?	N/A
Audio/visual recording	19	Did the research use audio or visual recording to collect the data?	6
Field notes	20	Were field notes made during and/or after the inter view or focus group?	6
Duration	21	What was the duration of the inter views or focus group?	6
Data saturation	22	Was data saturation discussed?	6
Transcripts returned	23	Were transcripts returned to participants for comment and/or	6

Topic	Item No.	Guide Questions/Description	Reported on Page No.
		correction?	
Domain 3: analysis and findings			
Data analysis			
Number of data coders	24	How many data coders coded the data?	6-7
Description of the coding tree	25	Did authors provide a description of the coding tree?	6-7
Derivation of themes	26	Were themes identified in advance or derived from the data?	6-7
Software	27	What software, if applicable, was used to manage the data?	6
Participant checking	28	Did participants provide feedback on the findings?	6
Reporting			
Quotations presented	29	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g. participant number	7-14
Data and findings consistent	30	Was there consistency between the data presented and the findings?	7-14
Clarity of major themes	31	Were major themes clearly presented in the findings?	7-14
Clarity of minor themes	32	Is there a description of diverse cases or discussion of minor themes?	7-14

Developed from: Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care*. 2007. Volume 19, Number 6: pp. 349 – 357

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Community-Clinic Linkages: Qualitative Provider Perspectives on Partnering with Community Health Representatives in Navajo Nation

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Title: Community-Clinic Linkages: Qualitative Provider Perspectives on Partnering with Community Health Representatives in Navajo Nation

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Abstract

Objective: To understand providers' opinions about the Community Outreach and Patient Empowerment (COPE) Project designed to strengthen Navajo Community Health Representative (CHR) outreach to individuals living with diabetes.

Design: This was a qualitative study nested within a larger evaluation of a program intervention.

Setting: The study took place in Navajo Nation and evaluated a program initiative designed to strengthen collaboration between CHRs and clinic-based healthcare providers and provide structured outreach to individuals living with diabetes in Navajo Nation. CHRs are a formal community health worker program that exists most tribal healthcare systems across the United States.

Participants: Healthcare providers involved in the program took part in one-on-one interviews.

Analysis: We used thematic analysis for this study. A team of three study staff used open-coding to create a codebook. Coded material were summarized and patterns were identified and tied into a narrative using concept mapping. The study design and instrument construction were guided by a Community Health Advisory Panel.

Results: A total of 13 interviews were completed. Providers acknowledged CHRs as an asset to the clinical team, and were enthusiastic about the COPE coaching materials, mentioning they provided a consistent message to CHRs and the community. Providers that led COPE trainings with CHRs valued the face-to-face time and opportunity to build relationships. Providers (n=4) supported CHRs' access to EHR to record patient visits and streamline referrals. Among their requests were having designated personnel to manage referrals with CHRs and a formal system to record modules CHRs have completed.

Conclusion: Providers participating in COPE activities valued the work of CHRs and endorsed further strengthening relationships and communication with CHRs. Healthcare programs should consider systems changes to integrate community health workers into clinic-based teams.

Article Summary:
Strengths and Limitations:

- Qualitative data presents first-hand information regarding the provider experience in a community-clinic linkage program.
- Active participation throughout the study by a Community Health Advisory Panel enriched the interview questions and interpretation of findings.
- Although saturation was obtained, the total number of participants was small and limited to providers who were involved in COPE.

Background:

In resource-poor communities, access to health care services is often inadequate. In these settings, Community Health Workers (CHWs) are healthcare professionals who can link patients to clinical facilities thereby improving patient health outcomes [1, 2]. One key strength of CHWs is that they represent the communities that they serve and thus deliver outreach in a culturally appropriate manner [3, 4].

Although serving a vital role in connecting patients to the healthcare system, research has shown that CHWs have largely been structurally excluded from major aspects of the healthcare system, including clear roles and workflows within care teams, participation in team meetings, and access to electronic health records [5, 6]. Conversely, when CHWs are integrated into the healthcare system, they are effective at improving healthcare outcomes for patients [7-9]. Effective integration of CHWs into the care team allows CHWs to share vital perspectives of the home environment to clinic-based healthcare providers who may have little or no insight into patient’s living situation and psychosocial surroundings. By expanding community-clinic linkages and connecting CHWs with the healthcare system, CHWs are better able to support both the patients and providers in forming an effective patient-centered care team [7, 10].

In the United States, Community Health Representatives (CHRs) are a long-standing workforce of community health workers who provide culturally-sensitive outreach to Native families living in vastly rural communities [11]. Because CHRs are typically operated as tribal programs and healthcare services are often delivered through the federal Indian Health Services, coordination between CHRs and clinical providers may be limited. In an effort to integrate CHRs with local clinic-based teams, a collaboration among the Navajo CHR Program, Navajo Area Indian Health Services (NAIHS), and Brigham and Women’s Hospital was established in 2009. The goal of this initiative, called Community Outreach and Patient Empowerment or COPE, was to integrate CHRs with healthcare teams.

Evaluation efforts have sought to understand how COPE impacts clinical and health systems outcomes, as well as diverse stakeholder perspectives including CHRs, clinic-based providers, and patients themselves. The impact on CHR-provider communication and clinical outcomes have been described elsewhere [12]. Nonetheless, sustainable improvements in health system performance rely on a shared sense of the systems to be improved, deeply engaged staff, and ongoing feedback systems [13]. To inform ongoing program improvement and understand potential for this program as a lasting and integrated component of the local healthcare system, we sought to understand the program’s impact on the experience of clinic-based healthcare providers. To our knowledge, this is the first study to explore the provider reported perspective and recommendations towards the utilization and integration of CHWs, including CHRs, into “cross-institutional” healthcare teams [14].

Methods:

Study Setting

The Navajo Nation is a federally recognized American Indian tribe in the United States covering regions of Arizona, New Mexico and Utah. Similar to other communities with few economic resources within the United States, the Navajo Nation lacks the infrastructure to allow for consistent access to quality health care. This largely stems from rural nature of the reservation, which has unpaved roads, long distances from patients' homes to healthcare centers, and a high degree of provider turnover within the healthcare facilities [15, 16].

Partially due to these inequities, diabetes and cardiovascular disease stand as some of the leading causes of death within American Indian and Alaskan Native communities within the United States [17, 18]. It has been estimated that roughly 25,000 Navajos have diabetes (around 21.5% of the adult population), and another 75,000 have been diagnosed with prediabetes [19]. Among Navajo people, cardiovascular disease and diabetes represent the third and fourth leading causes of death, respectively [20].

The Navajo Nation is divided up in to separate local governances called "chapters". These chapters are grouped geographically and represented by eight Service Units within the NAIHS. Each Service Unit has a health facility, sometimes with several satellite clinics.

Within the Navajo Department of Health, the Navajo CHR Outreach Program employs approximately 141 staff, including 99 CHRs [21]. Navajo CHRs are required to be trained as a Certified Nursing Assistant (CNA) and must speak Navajo. Many CHRs have additionally obtained certification and credentialing beyond the CNA required for the job, including CHW Certification through the state of New Mexico [22]. Typical services provided by Navajo CHRs include home visits to monitor vital signs and provide health education, referrals for additional services and resources needed by their client, community outreach for urgent or emergent issues, and health fairs and other health promotion activities. Each CHR is assigned to one or two chapters (usually where they themselves live). A CHR office is usually provided by the community within the Chapter House. CHR teams are organized by Service Units, with a team office typically located close to the service unit's main healthcare facility.

COPE Intervention

The COPE intervention consists of three main strategies: creating systems for referral, coordination and communication between CHRs and clinic-based providers; providing high-quality training to CHRs on health topics and motivational interviewing; and developing standardized outreach materials for CHRs to use with patients living with diabetes [4]. This intervention was delivered under program auspices; thus, the research to evaluate COPE's impact was observational in nature.

The partnership began when staff from the Division of Global Health Equity at the Brigham and Women's Hospital were invited to collaborate with Navajo Area Indian Health Services and the Navajo Nation CHR, specifically to bring technical assistance and tools developed from international programs in which community health workers have been successfully integrated into large-scale public health systems [23]. Initially, COPE Project staff met with the Navajo CHRs to determine what additional tools COPE could provide to increase the level of patient care for the CHRs. CHRs stated that a standardized set of patient teaching materials would be the most important aspect to improve their health care delivery on the Navajo Nation. COPE staff worked with CHRs and health care providers to develop culturally-specific health education materials in the form of flipcharts.

COPE staff then facilitated monthly trainings on these health education materials at all eight Service Units. For each training, the COPE team invites a local healthcare provider to deliver the training on their specialty or area of interest and provides the training materials (learning objectives, materials, competency assessment) to the trainer in advance. CHRs complete pre- and post-competency assessments, and both CHRs and trainers complete a feedback form to evaluate their satisfaction with the event and seek further suggestions for improvement. CHRs who receive a passing score (≥ 70%) on their post-competency assessment are then given the flipchart to use with their patients; if they do not pass, COPE staff schedule a follow-up one-on-one training to review materials and re-administer the competency assessment.

Other concerted efforts of the COPE Program included initiating case management meetings between CHRs and providers and establishing access for the CHRs in the Electronic Health Record (EHR) used by most Indian Health Service facilities. Nationally, CHWs have faced barriers documenting their patient encounters and communicating their observations to clinic providers. When COPE began, CHRs did not have access to the EHR. As a result of the COPE Program and supportive clinic providers, two of the Service Units were able to grant CHRs access to EHR. CHRs in those service units underwent HIPAA and information security training prior to gaining access to the electronic systems. Specific templates were created for providers to make referrals to CHRs and for CHRs to document their home visits. Improvements in communication were shown as a result of this system change [22].

Study Population

Providers were included in this study if they had previous experience or involvement with the COPE Program. Roles of COPE involvement by providers varied greatly from leading CHR training, facilitating meetings between clinic staff and CHRs, and referring patients to the CHR program.

Study Design

This was a qualitative study embedded within a broader observational study designed to evaluate the impact of the COPE intervention. COPE research staff approached healthcare providers via phone, email or in person to ask if they would be willing to participate in the study. For those providers who agreed to be interviewed, one of three trained study staff conducted the in-depth interviews lasting 15-35 minutes (CB, AL, and CK). None of the providers declined interviews. Interviews were conducted in English, either in person in clinic or by phone. They were transcribed verbatim by a note taker or digitally recorded and then subsequently transcribed. Transcripts were not reviewed by interviewers. Sampling ended when saturation was achieved. The study team determined that saturation was achieved when no new information about the impact of the COPE Program on provider care surfaced after three consecutive interviews. Specifically, after ten interviews, our team observed that three additional interviews did not contribute new information, resulting in 13 interviews total.

Research Team

The research team consists of one non-Navajo, female Physician who is also the study's Principle Investigator and organization's Executive Director (SShin, MD, MPH degree); five young male and female researchers working as either interns or study coordinators (CB, AL, CK, CC, and SSalt), all with BA's, and three of which are Navajo (CB, CC and SSalt); one Navajo, female Community Outreach Manager at COPE, who has also worked as a CHR (OM), one non-Navajo, female Clinical Applications Coordinator at Navajo Area Indian Health Services (KR, CNM degree), the Navajo female Program Director of the Navajo CHR & Outreach Program (MGB, MSW degree), and one non-Navajo female Qualitative Researcher/ Research Manager employed at Brigham and Women's Hospital and stationed at COPE (AKN, MPH, Msc degree). SShin has worked for twenty years as a researcher dedicated to community health interventions for patients with tuberculosis and HIV at Partners In Health sites including Haiti, Peru, and Russia and has led COPE since 2009. AKN has been working with Partners In Health as a Research Assistant and Qualtiative Researcher for nine years. MGB has been the Program Director for the Navajo CHR/ Outreach Program for eighteen years.

Patient and Public Involvement

The study was carried out using Community Based Participatory Methods, with ongoing input from a Community Health Advisory Panel (CHAP) comprised of patients and CHRs. The CHAP met quarterly. Prior to the study initiation, the CHAP provided feedback to define the overall study objectives, and specifically endorse this qualitative study of provider perspectives. The CHAP provided feedback on study staff developed the qualitative interview guide, with feedback from our Community Health Advisory Panel (CHAP) comprised of patients and CHRs. The CHAP was involved throughout the study, during quarterly meetings in which the study team presented aspects of the study (e.g. interview guide, sampling plan, preliminary findings, manuscript draft) and sought feedback through facilitated small group sessions. As an example, the provider interview guide was designed by study staff to understand the provider's experience working with CHRs and also specifically interacting with the COPE intervention. The interview guide was then presented and reviewed by CHAP, which is comprised of Navajo CHRs, patients, and the family members of patients. The goal of this review was to ensure the research and interview guide was culturally-informed and would elicit information of interest to patients and family members. Upon review, the CHAP recommended adding two questions that focused on food access and traditional/holistic medicine. The final interview guide is included in **[Supplement].** CHAP also provided feedback on the study findings, to ensure that interpretation of findings were consistent with their own perspectives as CHRs and patients. The public was also involved in the study, by obtaining initial approval from Tribal Agency Councils and Health Boards, and by formally presenting results to these same groups at the end of the study.

Data Analyses

Thematic analysis was used to analyze qualitative data, in order to respond to themes emerging from the providers themselves [24]. All transcriptions were de-identified and uploaded into the Dedoose software [25]. Pseudonyms were assigned to each respondent. Themes were not determined in advance, rather they emerged from the interview data. A team of a qualitative researcher (AKN) and two research assistants (CB, AL) coded interviews using open coding. First, codes were identified by the study team, and then clustered based on team discussion into broader themes. Four themes emerged which made up the final codebook: general interaction with COPE, implementation of COPE within the service unit, the impact of COPE, and improvement of COPE and related activities. Interviews were then reviewed again by the same team and coded independently. Inter-rater reliability was tested and kappa scores of 0.49, 0.49, 0.46 were achieved. Discrepancies in coding were discussed with a qualitative researcher and finalized based on group discussion. A brief synopsis for each code was them generated, describing the number of respondents endorsing each code, as well as patterns of concordance and contrasts among respondents. These findings were then unified into a narrative using concept mapping. When organized by theme, the narrative was somewhat redundant; therefore, the team chose to organize the narrative into three cross-cutting topics, which emerged as the most salient program features based on provider responses. To further assess validity of coded results, findings were triangulated with field observation among COPE staff as well as CHAP feedback.

Choice of terminology

In this study, the study team decided to use the term CHR (Community Health Representative) instead of CHW (Community Health Worker) which is a broader term inclusive of CHRs. Navajo CHRs refer to the community members that they work with as clients rather than patients; for this reason, we use the term "clients" although providers may refer to the same individuals as "patients."

The term providers used throughout this paper is intended to be encompassing of multiple different hospital staff that have direct contact with patients. Examples of providers interviewed range from doctors, nurses, public health nurses, CHR supervisors.

The term community-clinic linkages refers to relationships between clinical provider teams and community-based resources to improve delivery of care and health outcomes through greater communication and collaboration across three key stakeholders – the clinic/clinician, the patient, and the community resource [26, 27].

Ethical considerations

The Ethics Committee of Partners Healthcare and the Navajo Nation Human Research Review Board approved the study. All participants signed a consent to participate in this study.

Results:

A total of thirteen providers from five service units were interviewed [**Table 1**]. Five interviews took place by phone and eight in-person at the interviewee's worksite. Findings related to three major aspects of the program: acknowledging the importance of community-clinic linkages, endorsement of COPE training and materials, and an appreciation for CHR access to electronic health records.

Acknowledging the Importance of Community-Clinic Linkages

Overall, most providers (10) explicitly acknowledged the importance of the CHR role and described CHRs as a "big interface to allow the community to interact with the hospitals." Providers acknowledged the unique value of CHRs' outreach work, knowledge in health education and management, knowledge of community/resources, and ability to see patients in their own living environment. Through COPE interactions, providers gained a deeper appreciation of the role of CHR.

[Due to COPE], there is a closer interaction that we have with the CHRs because we both serve the same population of people. They're able to do the outreach piece of it, more so than we are.

Yes, a closer interaction with the CHRs to help bridge the gap where we can't meet the patient out in the communities per se.

- Catherine, Nurse Practitioner

We were pounding home [to the CHRs]: "You're the ones who have eyes and ears on these people, you're very valuable." And over a period of time, they started understanding that they were an asset, that they had things to offer that no doctor, very, very few nurses, would understand, because they were in the home. They can see things that we would never see.

- Kate, Diabetes Educator

Nonetheless, almost all providers felt that there was a need for increased formalized collaboration, specifically in the form of an interdisciplinary team. Multiple providers suggested increased face-to-face collaboration through the creation of formalized multidisciplinary health teams, regular inter-professional meetings consisting of PHNs, CHRs, clinicians, nurses, and diabetes educators. *"Arranging actual meetings, physical meetings"* to learn about respective programs could also increase an understanding of how programs could work together. One provider expressed concern that CHRs are hard to get to know since they are not based at the hospital.

It'd be great if we could get to know certain CHRs better, so we could really maintain communication with them, and they would feel more comfortable talking to us… Just being able to get to know the CHRs better, I think would increase communication, and have them be more comfortable talking to me, calling me about patients, that would really change up some of the ways that we practice. - Andrew, Physician

[It] would be great for them to meet with the diabetes educators… Some of the requests for teaching the CHRs, it'd probably great for the diabetes educators to help because they're RN-level providers, so they could actually help with a lot of the diabetes education with the CHRs… [There are] a lot of ways that we could all kind of work together better. - Janet, Physician

Providers cited case management as a formalized way that many service units currently arrange for different fields to come together to discuss patient care. While more than half of the providers reported ongoing case management teams in their service unit, they described mixed feelings toward case management. While some providers (3/6 who had case management at their facility) felt that case management was useful and worth the time investment, others (2) expressed skepticism because they felt it was unnecessary or time-consuming. Providers indicated that barriers to successful case management programs included high provider turnover, short staffing, and lack of time or inflexibility in schedules.

They had never used case managers here in the diabetes program before…. So I brought the concept of case management to the table, and our CHRs began to identify some of their problem clients in the community. And we would have complex care case management meetings with the public health nurse, the doctor, all the family members, and tried to get as much clear understanding of what some of the problems or barriers to care were. And, before long the CHRs and the public health nurses began working really, really, really close together. We were just seeing the success of the whole idea, the whole program.

-Kate, Diabetes Educator

[Would case management be useful?] It just depends on the patient and how much time people have to do meetings. I know PHN do, but I usually don't have time. For me it's better if I do individual follow up on someone I've referred. *– Rosita, Diabetes Educator*

Lastly, many providers mentioned their own or their colleagues' lack of awareness of the COPE Project. Because of high provider turnover rates, one provider suggested quarterly meetings with progress updates as "an opportunity to educate the people that have just joined the staff." Providers suggested that increasing awareness and sharing results about COPE could increase referrals and reach more beneficiaries.

As a clinician, I want to know outcomes. If someone is going to take the CHRs' time and resources, to send them to a place to do this, I want to know that it works, you know?

- Abigail, Physician

If we were more aware of [CHRs], we probably could reach out to them more and utilize them more and they could utilize us more too. *- Janet, Physician*

If… we could collaborate more it would benefit the patient population that we work with. There's many people that could be seen, and I think that sometimes, because of the overwhelming numbers, not as many patients get touched because we don't even think about referring.

- Tonya, Diabetes Specialist

Endorsement of COPE training and materials

Eight of the providers felt that the health education materials and trainings provided by the COPE Program helped to foster collaboration with CHRs by increasing message consistency. Most providers recognized the "COPE Flipcharts" as a powerful health education resource for CHRs, patients, and the clinics. Providers reported the large variety of topics and use of visuals in the COPE health education materials were thought to be helpful in relaying information.

There's a lot of health topics that they've covered. When I see their monthly [training] activity, there's a lot of topics, using the flipchart and having a resource available that they can use.

- Rosita, Diabetes Educator

Making the modules, the little flipcharts, I think that's a good idea for staff to have. They pull it out for a topic, and I know it's consistent with what we teach.… and I know that they're competent to teach what they're teaching. That makes a big difference.

- Harriett, CHR Supervisor

Interestingly, by increasing the consistency of the information taught by both clinical and homecare teams, the health education materials also built trust and confidence in the CHRs among providers and patients. Many providers felt that having provider-led trainings aided in delivering a consistent message to CHRs, and ultimately to the patients.

Through bolstering the education that the community health workers receive, I think it's making sure what their story is matched by what the patients receive in the hospital as well. We've always had a disconnect, historically… In other words, the community health worker might tell the patient one thing, and then the patients receives completely different information in the hospital, and now the patient doesn't trust anybody. And now,… the patient has trust because they're hearing the same information because the community health worker is now educated, and COPE has been that bridge.

- *Charlene, Nurse Midwife*

Having the providers, the primary care providers, participate in education with the CHRs, I think, is really important because that way the providers are more likely to refer to the program because the providers have the confidence… about the types of information the CHRs are going to provide and their knowledge base.

- *Janet, Physician*

Providers felt that educational materials could be further used to reach a broader audience. While providers reported feeling that both the educational materials and flipcharts were helpful, some providers felt that the materials were currently underutilized and that it would be helpful to record which CHRs had received training in which modules. One provider noted the challenges around discussing difficult topics, such as alcohol use. This provider suggested the "COPE Flipcharts" could provide CHRs with more confidence in addressing these topics and patients could be more receptive.

The education is something that works well. I do think that more patients could benefit from the education that COPE is providing.

- *Tonya, Diabetes Specialist*

The majority (n = 8) of providers interviewed indicated they had delivered at least one CHR training, using COPE materials. Providers stated that the trainings ultimately increased face-to-face time between providers and CHRs. During these interactions, the providers felt they were also able to directly address CHR concerns and questions.

It was nice that COPE has started to invite the providers to give some of those teaching sessions, because that way we can make sure the message the CHRs are delivering is in line with the same message that like we deliver to patients when they come to their clinic visit.

- *Janet, Physician*

My one interaction was them face to face has been with the talk I gave. I was able to address some concerns that they had.

- *Gerry, Public Health Nurse*

Providers indicated, however, a lack of clarity around which CHRs were trained in which COPE modules (topics) and how they were using the flipcharts in the homes. Providers stated that knowing what topics the CHRs were trained to deliver could help them identify the best patients for referral and request specific health education topics for individual patients. One provider suggested possible regular updates on recent CHR trainings.

I think they have all the materials, kind of like resources, but I don't know how [they] actually use them. I don't actually know if they go through the whole curriculum…

Charlene, Nurse Midwife

CHRs access to Electronic Health Records

Ten of the providers supported systems to improve communication with the CHR team, and four specifically endorsed CHR integration into EHR to record patient visits and streamline referrals, regardless of whether their service unit currently had this system in place.

Two providers from a service unit where CHRs had access to EHR reported they were aware that CHRs in their service unit had access to the EHR. These providers stated that their ability to send referrals to CHRs through the EHR has been valuable in seeing CHR notes with ease. Providers also felt the EHR helped to close the feedback loop between their practice in the clinic and the CHR's combined community outreach and public health education. They then acknowledged that this increased the ability for CHR-provider interaction and enabled providers and CHRs to collaborate more easily. Providers reported they used the EHR to share information about their patients with the CHRs. In some cases, providers reported that they would modify their care plan based on critical data provided in the CHR notes. Overall, providers reported that the feedback from the CHR through the EHR system was both useful and appreciated.

When I see the patient and I kind of look through their chart, and I see that the CHRs left a note, I will say, "I hear that one of our CHRs came out to visit you, they were mentioning this that and the other, I'm concerned about that."… and then sometimes, if that means that I need to see the patient sooner, , I might try to schedule the patient sooner."

- *Andrew, Physician, site with CHR access to EHR*

In contrast, providers who worked in service units without access to EHR reported difficulty in locating CHR documentation and receiving feedback from their referrals to the CHRs. Providers stated that they felt CHR's paper records from their home visits were cumbersome to read and providers eventually stopped requesting them. They also described frustration when they failed to hear back from the CHR after making a referral due to limited follow-up communication. They felt that they could not determine whether the patient was successfully visited or enrolled in the CHR's care, nor discern what occurred at these visits.

"There are challenges because we don't share EHR electronic notes. So we don't always get a chance to see what is being done with that CHR and patient in the community. I mean they do a

note, and it probably goes in the [paper] chart, but … if it's not in EHR, I really don't pull a chart unless I absolutely have to."

- *Catherine, Nurse Practitioner, no EHR access*

When I put in a referral, I don't get notified…. Sometimes I don't get any feedback in terms of what was the outcome of the [CHR] visit, [or] if there was any interaction done at all with some of the patients.

- *Gerry, Public Health Nurse, no CHR access to EHR*

Providers at sites where CHRs did not have access to the EHR endorsed the prospect of granting CHRs access to EHR in the future. One provider stated that receiving feedback from CHRs via EHR would encourage providers to continue referring patients to the CHRs because they would be able to see the results of their referral and further incorporate the CHR notes into their patient's treatment plan.

Getting those EHR notifications, I think it is really helpful because if you refer to a program but you never get any feedback on how your patients are doing, or what's happening, it's kind of discouraging and people often won't continue to refer if that's the case. So, I think like getting some sort of feedback about what interventions are performed with the patient, how their doing, things like that really encourage the providers to continue to refer.

- *Janet, Physician, Service Unit with no EHR access*

Discussion:

Three main themes emerged from the perspectives of the providers: an acknowledgement of the importance in developing clinic-community linkages, an endorsement of the COPE materials being delivered by the CHRs, and the necessity for CHRs to be integrated into the EHR. The themes that emerged are similar to other situations on a national level where health care providers grapple with a further integration of CHWs into clinical care teams [10, 28]. Although difficult, other studies have shown positive outcomes from this integration [29]. The remarks from providers in this qualitative study works to support the current literature on this subject and encourages integration of the "quadruple aim" – that of improving provider satisfaction – alongside the standard triple aim of enhancing patient experience, improving population health, and reducing costs [30]. One recommendation to address provider satisfaction is creating healthy "care teams" including expanded roles that allow delivery of preventive care and health coaching to patients. The importance of achieving a sense of joy and self-efficacy among healthcare providers highlights the challenges of staff burnout, particularly in settings where staff turnover and workload is high.

Providers recognized the critical role of the CHRs in the healthcare team and felt that increased interactions (e.g. informational exchanges, inter-professional meetings including case management, and quarterly progress updates) would strengthening the relationship between CHRs in the field and providers in the clinic.

Almost all the providers interviewed responded positively to the COPE materials and the quality of the health education that CHRs were delivering in their communities. By involving local providers in the development of educational materials and delivery of training, providers had confidence in the materials and felt reassured that information provided by CHRs would be consistent with what patients were being told in clinic. We felt that this was one of the strongest aspects of the intervention. Provider-led trainings increased collaboration with CHRs by building trusting relationships and stimulating greater collaboration.

Our findings support the need to integrate CHRs through shared access to the Electronic Health Record. EHR access has provided a quick and streamlined process to refer patients to CHRs and critical sharing of important information that improved providers' ability to care for their patients. As healthcare systems move increasingly toward paperless systems, providers rarely review hand-written notes by CHRs [31]. This provider perspective highlights the importance of advocacy among clinicians to facilitate CHR access to EHR. Across tribal communities, many Indian Health Service sites utilize the same electronic health record system, providing a unique opportunity to utilize training and clearance protocols as well as EHR templates developed in Navajo to any interested site.

Our study has several limitations. Because COPE team members conducted the interviews, providers may not have been as truthful about negative experiences and interviews may have been less comfortable probing for negative feedback. On the other hand, the interview guide included questions explicitly asking about implementation challenges and opportunities for improvement. We feel that providers were honest about their experiences with the COPE Program, the Navajo Area IHS System, and the Navajo Nation CHR Program based on their wide range of responses including frank discussion of challenges in the program. All of the providers that were interviewed as a part of this study had some relationship to the COPE Program, and were therefore more likely to be advocates for the program and for CHRs in general. We recognized that these responses do not necessarily reflect perspectives among all providers across these healthcare facilities. While not the scope of this study, interviewing providers not involved with COPE could have provided a more accurate reflection of the general population of providers, as well as insight on how to involve more providers. In fact, those who participated in this study felt that more providers should be aware of this program and the role of CHRs. They suggested that the materials could be used to provide health coaching to more patients, and also emphasized the need to increase awareness of CHRs and the COPE intervention among the broader community of clinic-based providers.

Conclusion:

Providers who worked with CHRs and the COPE intervention expressed a strong appreciation for the unique role of CHRs and the value of COPE's standardized health education materials and CHR trainings. At a system level, providers were able to work more closely with CHRs when they shared access to Electronic Health Records. Successful integration of community health workers into interprofessional healthcare teams may inform CHW programs across a variety of settings. Further research to better understand the patient experience would complement the provider perspective to determine whether and how integration of CHWs into healthcare teams also improves the patient experience of care.

Declarations:

Ethics:

The Ethics Committee of Partners Healthcare and the Navajo Nation Human Research Review Board approved the study. All participants signed a consent to participate in this study.

Consent for Publication:

All study participants provided informed consent for their data to be used in research and publication.

Availability of data and materials:

All research data is property of the Navajo Nation as per Navajo Human Research Review Board (NHRRB) protocols. Investigators who seek to use this data would need to request permission from the NHRRB and provide reassurance that their request is consistent with applicable privacy, confidentiality and other legal requirements.

Competing Interests:

Dr. Sonya Shin discloses that she has served as the Executive Director for a 501(c)3 organization, entitled Community Outreach and Patient Empowerment Program which continues to support the described program, since study completion.

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The Navajo Nation Human Research Review Board as well as the Partners Institutional Review Board reviewed and approved the study protocol. All results have been presented to the Navajo Nation Human Research Review Board (Protocol #NNR-11.150).

Author contributions:

CB led the qualitative analysis team as a junior investigator. He coded interviews, conducted analysis, and drafted all sections of the manuscript.
AL was part of the analysis team and helped conduct and code interviews, conduct analysis, and edit the final manuscript.
CC was part of the analysis team and helped to code interviews, conduct analysis, and edit the final manuscript.
CK conducted and transcribed interviews and provided edits on the final manuscript.
OM was part of the analysis team and provided input on the results and final manuscript. She is a Navajo researcher with experience working as a CHR.
SS was part of the analysis team and helped to code interviews, conduct analysis, and edit the final manuscript.
KR works for IHS and is involved in the design, maintenance, and advocacy for the use of the EHR across all Navajo health sites. She provided feedback about the EHR and its function within the Navajo health facilities during data collection and analysis and edited the final manuscript.

MGB is the Program Director of the Navajo Nation Community Health Representative and Outreach Program. She provided feedback during the design of the study, data analysis, and edited the final manuscript.
AKN is a qualitative researcher. She guided the team in the methods of designing the study and conducting data analysis, incorporated edits from all authors. She provided a qualitative methods perspective to the final manuscript.
SS is the PI for this study. She guided the team in the design of this qualitative study and provided high level support in the analysis and drafting of the manuscript. She provided clinical perspective on the findings.

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Table 1. Occupation and Number of Participants*

Job Title	Number of Participants
Physician	5
Diabetes educator / specialist	4
Case Manager	1
Registered Nurse	5
Public Health Nurse	3
Nurse Practioner	1
Nurse Midwife	1
CHR Supervisor	1

*Note: Some participants have more than one title. Quotes are not linked with specific Service Units or job titles in order to protect participants' confidentiality.

References:

1. Brown HS 3rd WK, Pagán JA, Arcari CM, Martinez M, Smith K, Reininger B. : **Cost-effectiveness analysis of a community health worker intervention for low-income Hispanic adults with diabetes**. *Prev Chronic Dis* 2012, **9**.
2. Condo J: **Rwanda's evolving community health worker system: a qualitative assessment of client and provider perspectives**. *Human resources for health* 2014, **12**(1).
3. Pérez LM MJ: **Community Health Workers: Social Justice and Policy Advocates for Community Health and Well-Being**. *American Journal of Public Health* 2008, **98**(1):11-14.
4. Gampa V, Smith, C., Muskett, O., King, C., Sehn, H., Malone, J., Curley, C., Brown, C., Begay, M.G., Shin, S., Nelson, A. K.: **Cultural elements underlying the community health representative – client relationship on Navajo Nation**. *BMC Health Services Research* 2017, **17**(19).
5. Kangovi S, Grande, D., Trinh-Shevrin, C.: **From rhetoric to reality--community health workers in post-reform U.S. health care**. *New England Journal of Medicine* 2015, **372**(24):2277-2279.
6. Allen CG, Escoffery, C., Satsangi, A., Brownstein, J.N.: **Strategies to Improve the Integration of Community Health Workers Into Health Care Teams: "A Little Fish in a Big Pond"**. *Preventive Chronic Disease* 2015, **17**(12).
7. Allen CG: **Strategies to Improve the Integration of Community Health Workers Into Health Care Teams: "A Little Fish in a Big Pond"**. *Preventing chronic disease* 2015, **12**.
8. Shah M KE, Heisler M.: **The Role of Community Health Workers in Diabetes: Update on Current Literature**. *Current diabetes reports* 2013, **13**(2):163-171.
9. Malcarney MB PP, Quigley L, Horton K, Seiler N.: **The Changing Roles of Community Health Workers**. *Health Serv Res* 2017, **52**(Suppl 1).
10. Findley S MS, Hicks A, Chang J, Reich D.: **Community health worker integration into the health care team accomplishes the triple aim in a patient-centered medical home: a Bronx tale**. *J Ambul Care Manage* 2014, **37**(1):82-91.
11. **Navajo Community Health Representative.** [http://www.nndoh.org/chr.html]
12. Trevisi L, Orav, J., Atwood, S., Brown, C., Curley, C., King, C., Muskett, O., Sehn, H., Nelson, A.K., Begay, M.G., Shin, S.: **Integrating Community Health Representatives with Health Care Systems: The Impact on Clinical Outcomes in Navajo Nation**. In: *American Public Health Association Annual Meeting: November 4-8 2017; Atlanta, GE*; 2017.
13. **Getting Started Kit: Rapid Response Teams** [www.ihi.org]
14. Sequist TD, and Elsie M. Taveras.: **Clinic–community linkages for high-value care**. *New England Journal of Medicine* 2014, **371**(23):2148-2150.
15. English KC: **Intermediate outcomes of a tribal community public health infrastructure assessment**. *Ethnicity and Disease* 2004, **14**(3):S1-61.
16. Kim C: **Recruitment and retention in the Navajo Area Indian Health Service**. *Western Journal of Medicine* 2000, **173**(4):240.
17. **American Indian and Alaska Native Heart Disease and Stroke Fact Sheet** [https://www.cdc.gov/dhdsp/data_statistics/fact_sheets/fs_aian.html]
18. **Native Americans with Diabetes** [https://www.cdc.gov/vitalsigns/aian-diabetes/]

19. **Diné Food Sovereignty: A Report on the Navajo Naton Food System and the Case to Rebuild a Self-sufficient Food System for the Diné People** [http://www.dinecollege.edu/institutes/DPI/Docs/dpi-food-sovereignty-report.pdf]
20. **Navajo Nation Mortality Report, 2006 - 2009. Navajo Mortality Report New Mexico Portion, 2010 - 2013** [www.nec.navajo-nsn.gov]
21. **Presentation by Mae-Gilene Begay, Program Director to Arizona Advisory Council on Indian Healthcare**. In. Edited by Navajo Nation Community Health and Outreach Program NDoH; 2018.
22. King C GA, Gampa V, Smith C, Muskett O, Brown C, Malone J, Sehn H, Curley C, Begay MG, Nelson AK, Shin SS: **Strengthening the role of Community Health Representatives in the Navajo Nation**. *BMC Public Health* 2017, **17**(1):348.
23. Behforouz HL, Farmer, P.E., Mukherjee, J.S.: **From directly observed therapy to accompagnateurs: enhancing AIDS treatment outcomes in Haiti and in Boston**. *Clinical Infectious Disease* 2004, **1**(38):Suppl 5:S429-436.
24. Clarke V, Braun, V., Terry, G., Hayfield N.: **Thematic analysis**. In: *Handbook of research methods in health and social sciences.* edn. Edited by Liamputtong P. Singapore: Springer; 2019: 843-860.
25. Dedoose: **Dedoose Version 7.0.23, web application for managing, analyzing, and presenting qualitative and mixed method research data**. In. Edited by SocioCultural Research Consultants Lwdc. Los Angeles, CA; 2016.
26. **Community-Clinical Linkages for the Prevention and Control of Chronic Diseases: A Practitioner's Guide**. In. Atlanta, GA: Centers for Disease Control and Prevention, U.S. Department of Health and Human Services; 2016.
27. **Clinical-Community Relationships Evaluation Roadmap** [https://www.ahrq.gov/prevention/resources/chronic-care/clinical-community-relationships-eval-roadmap/index.html]
28. Shah M HM, Davis M.: **Community Health Workers and the Patient Protection and Affordable Care Act: An opportunity for a research, advocacy, and policy agenda**. *Journal of health care for the poor and underserved* 2014, **25**(1):17-24.
29. Otero-Sabogal R AD, Siebold S, Hallen E, Lee R, Ketchel A, Li J, Newman J.: **Physician-community health worker partnering to support diabetes self-management in primary care**. *Qual Prim Care* 2010, **18**(6):363-372.
30. Bodenheimer T SC: **From Triple to Quadruple Aim: Care of the Patient Requires Care of the Provider**. *Annals of Family Medicine* 2014, **12**(6):573-576.
31. Furukawa MF KJ, Patel V, Hsiao CJ, Adler-Milstein J, Jha AK.: **Despite substantial progress In EHR adoption, health information exchange and patient engagement remain low in office settings**. *Health Affairs* 2014, **33**(9):1672-1679.

Supplement: Interview Guide Used as a Part of Provider Interviews

How did you start working with COPE? (Variations: what motivated you to work with COPE, how did you hear about COPE, etc.? Introduced to COPE through a CHR or provider?)

What are some ways in which you interact with COPE? (Case management? education? training?)

In terms of working with COPE, what works well in your Service Unit? What could be improved? Do teams collaborate well?

Are there challenges in your Service Unit you feel like COPE could play a greater role or assist in addressing?

What are some challenges in implementing COPE in your Service Unit? What can be done to improve collaboration with COPE at SU? (ex. Management challenges)

Has COPE impacted communication/collaboration within your Service Unit? (Probe: clinic settings? community settings?) Do you believe that the collaboration has impacted patients' health outcomes? (If so, how?)

Do you feel that COPE has impacted your work day-to-day? (If so, how?)

Do you refer patients? How do you decide if you will refer a patient to COPE?

Can you describe a typical interaction with COPE patients? Is it different from interactions with non-COPE patients (Probe: clinic visit, home visit, education sessions?)

Can you describe a typical case management meeting?

If you do not have case management in your Service Unit, do you think it would be useful to? What are the barriers?

*How does food access impact patient health in your service unit? **

*Do you use holistic medicine, traditional medicine, or traditional teachings in your practice? **

***These questions were added to the analysis as part of a request from the COPE Community Health Advisory Panel.**

COREQ (COnsolidated criteria for REporting Qualitative research) Checklist

A checklist of items that should be included in reports of qualitative research. You must report the page number in your manuscript where you consider each of the items listed in this checklist. If you have not included this information, either revise your manuscript accordingly before submitting or note N/A.

Topic	Item No.	Guide Questions/Description	Reported on Page No.
Domain 1: Research team and reflexivity			
Personal characteristics			
Interviewer/facilitator	1	Which author/s conducted the interview or focus group?	6
Credentials	2	What were the researcher's credentials? E.g. PhD, MD	6
Occupation	3	What was their occupation at the time of the study?	6
Gender	4	Was the researcher male or female?	6
Experience and training	5	What experience or training did the researcher have?	6
Relationship with participants			
Relationship established	6	Was a relationship established prior to study commencement?	6
Participant knowledge of the interviewer	7	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research	6, 14
Interviewer characteristics	8	What characteristics were reported about the inter viewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic	6, 14
Domain 2: Study design			
Theoretical framework			
Methodological orientation and Theory	9	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis	6
Participant selection			
Sampling	10	How were participants selected? e.g. purposive, convenience, consecutive, snowball	6
Method of approach	11	How were participants approached? e.g. face-to-face, telephone, mail, email	6
Sample size	12	How many participants were in the study?	7
Non-participation	13	How many people refused to participate or dropped out? Reasons?	N/A
Setting			
Setting of data collection	14	Where was the data collected? e.g. home, clinic, workplace	6
Presence of non-participants	15	Was anyone else present besides the participants and researchers?	6
Description of sample	16	What are the important characteristics of the sample? e.g. demographic data, date	6, 18
Data collection			
Interview guide	17	Were questions, prompts, guides provided by the authors? Was it pilot tested?	6
Repeat interviews	18	Were repeat inter views carried out? If yes, how many?	N/A
Audio/visual recording	19	Did the research use audio or visual recording to collect the data?	6
Field notes	20	Were field notes made during and/or after the inter view or focus group?	6
Duration	21	What was the duration of the inter views or focus group?	6
Data saturation	22	Was data saturation discussed?	6
Transcripts returned	23	Were transcripts returned to participants for comment and/or	6

Topic	Item No.	Guide Questions/Description	Reported on Page No.
		correction?	
Domain 3: analysis and findings			
Data analysis			
Number of data coders	24	How many data coders coded the data?	6-7
Description of the coding tree	25	Did authors provide a description of the coding tree?	6-7
Derivation of themes	26	Were themes identified in advance or derived from the data?	6-7
Software	27	What software, if applicable, was used to manage the data?	6
Participant checking	28	Did participants provide feedback on the findings?	6
Reporting			
Quotations presented	29	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g. participant number	7-14
Data and findings consistent	30	Was there consistency between the data presented and the findings?	7-14
Clarity of major themes	31	Were major themes clearly presented in the findings?	7-14
Clarity of minor themes	32	Is there a description of diverse cases or discussion of minor themes?	7-14

Developed from: Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care*. 2007. Volume 19, Number 6: pp. 349 – 357

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