AIDS and Behavior (2019) 23:1158–1165
https://doi.org/10.1007/s10461-018-2287-y

ORIGINAL PAPER

Exploration of Implementation Patterns and Content from a Text-Based Outreach Intervention Clinical Trial for Newly Diagnosed, HIV-Positive MSM in Beijing, China

Angela Knudson[1] · Sarah Shaw[1] · Lu Yin[2,8] · Dong Xiao[3] · Han-Zhu Qian[2,4,9] · Stephen Sullivan[5] · Hongjie Liu[4] · Yuhua Ruan[6] · Yiming Shao[6] · Sten H. Vermund[2,7,9] · K. Rivet Amico[1]

Published online: 4 October 2018

Abstract

The *Multi-component HIV Intervention Packages for Chinese MSM* (China MP3) project sought to facilitate engagement in care and initiation of antiretroviral therapy among newly HIV-diagnosed men who have sex with men in Beijing, China through the implementation of in-person peer-counseling (PC) and a weekly short message service (SMS)-based outreach text with as-needed follow-up during the first 12-months of living with HIV. Implementation of the interactive text-based intervention used a 'ticket system' to monitor and document responses to texted check-ins and PC follow-up. Using this tracking system, we characterized the 1521 tickets generated during the China-MP3 intervention across 184 intervention participants. A wide variety of topics were the focus of interactions prompted by texted outreach although most appeared to focus on issues related to ART and CD4 and viral load. Almost all participants engaged in at least one SMS-related discussion. Sending regular check-ins may offer unique opportunities to newly diagnosed MSM to ask questions or gather support between face-to-face visits.

Keywords Text messaging · HIV · China · Sexual and gender minorities · Peer counseling

Introduction

Although the overall adult prevalence of HIV in China is less than 0.1%, certain regions are more severely impacted, including Yunnan, Guangxi, Sichuan, Henan, Xinjiang, Guangdong, Chongqing, Hunan and Guizhou Provinces [1]. These nine regions account for about 79% of the total number of people living with HIV (PLHIV) in China [1]. Additionally, certain key populations, such as men who have sex with men (MSM) and people who inject drugs, experience higher prevalence and incidence rates [2, 3], with prevalence among MSM in 2013 as high as 7.3% [2].

MSM in China have had documented increases in rates of HIV infection over the past several years [4, 5]. Rapid and

✉ K. Rivet Amico
ramico@umich.edu

1 Department of Health Behavior and Health Education, School of Public Health, University of Michigan, 1415 Washington Heights, Ann Arbor, MI 48109-2029, USA

2 Vanderbilt Institute for Global Health, Vanderbilt University Medical Center, Nashville, TN, USA

3 Chaoyang Chinese AIDS Volunteer Group, Beijing, China

4 Division of Epidemiology, Department of Medicine, Vanderbilt University Medical Center, Nashville, TN, USA

5 Department of Health Behavior and Biological Sciences, School of Nursing and the Center for Sexuality and Health Disparities, University of Michigan, Ann Arbor, MI, USA

6 State Key Laboratory of Infectious Disease Prevention and Control, Collaborative Innovation Center for Diagnosis and Treatment of Infectious Diseases, Chinese Center for Disease Control and Prevention, Beijing, China

7 Division of Pediatric Infectious Diseases, Department of Pediatrics, Vanderbilt University Medical Center, Nashville, TN, USA

8 Present Address: Fuwai Hospital/Chinese Academy of Medical Sciences, Beijing, China

9 Present Address: Yale School of Public Health, New Haven, USA

durable viral suppression among newly diagnosed MSM is essential to reaching UNAIDS 90-90-90 targets [6]. Linkage to and retention in HIV-care, with receipt of effective ART, can not only reduce the risk of HIV transmission but also plays a critical role in improving health outcomes [7–9]. MSM in China, however, are less likely to initiate ART compared with other individuals living with HIV in China [10, 11]. As HIV testing efforts expand [12], the need to facilitate rapid linkage to care, access to ART and ART adherence for newly diagnosed MSM is critical but there are few interventions for newly diagnosed MSM in China [13, 14].

The Multi-Component HIV Intervention Packages for Chinese MSM (China MP3) project addressed this gap through the evaluation of a combination intervention model using peer-support and text messaged "check-ins" to promote ART access, adherence and viral suppression among newly diagnosed MSM in Beijing, China. Our earlier work suggested that a peer-counselor delivered intervention with texted weekly check-ins, and then staggered, asking newly diagnosed MSM if they would like to talk with their peer-counselor between scheduled visits may address adherence and care-use challenges reported by this population. Focus groups conducted in preparation for the China MP3 project identified barriers to engagement in HIV care among MSM in China that included: perceptions of discrimination from healthcare providers; lack of guidance and/or follow-up from healthcare staff; conflicts with clinic operating hours; distance of locations for viral load testing and antiretroviral therapy (ART) drug pickup; concerns with HIV status disclosure and sexuality; the psychological burden of long-term engagement in HIV care; and concerns about ART [15]. Facilitators to engagement in HIV care have included: peer referral and having a companion-free HIV care; peer counseling from an HIV-positive MSM; extended efforts/involvement for linking MSM to HIV care services; and standardizing the quality of HIV care across the country [15]. Because many of these factors occur outside of the clinic, per se, using SMS delivered, texted check-ins was envisioned to offer opportunities for newly diagnosed MSM to make use of available support and services as and when needed, rather than waiting for their next scheduled clinic visit or having to physically present themselves at service agencies to get advice, information or support. Modeled after the WelTel Kenya intervention approach [16], and other demonstrated text-based outreach interventions with MSM in the US [17] and in general populations living with HIV in China [18, 19], the China MP3 project sought to evaluate the impact of a peer-counselor support and text-outreach on viral suppression in newly diagnosed MSM in China between March 2013 to May 2015. Primary results are in preparation.

The current evaluation focuses specifically on the implementation of the texted check-in messages and related responses and follow-up to them. Using the detailed implementation monitoring database generated to track use of the texted check-in messages in the China MP3 project, we explore the implementation of the interactive, texted, check-in messages and the kinds of issues MSM brought up with peer counselors during follow-up discussions. Whether or not, to what extent, and for what issues MSM made use of texted-outreach from clinic- and service-based peer-counselors (PC) provides important information about mobile eHealth support strategies in this population.

Methods

Study Design and Population

The China MP3 project (ClinicalTrials.Gov number: NCT01904877) was conducted in Beijing, China. A combination prevention approach, the project included two phases: Phase I—expanded HIV testing among MSM; and Phase II—randomized clinical trial of text messaging and peer counseling for enhancing linkage and promoting HIV care among those who were diagnosed with HIV infection in Phase I. Expanded HIV testing was conducted from March 2013 to March 2014. The inclusion criteria for participation were man or transgender woman who were 18 years or older, self-reported sex with men in the past 12 months, lived in Beijing, and were able and willing to provide written informed consent (26, 34–37). The Phase II trial was conducted from March 2013 to May 2015. Participants from the Phase I study who were diagnosed with HIV were eligible for participation in the Phase II trial if they had a cell phone, were willing to receive study related short message texts and engage in other study procedures, and had no plans to move away from Beijing in the next 12 months. A total of 367 HIV-infected eligible MSM were randomly assigned at 1:1 allocation ratio to either intervention (n = 184) or standard of care (SOC) arms (n = 183). Participants in the SOC arm received routine counseling and referrals for linkage to care, risk reduction, and ART initiation by local Center for Disease Control (CDC) or hospital staff. Participants in intervention arm received SOC plus enhanced support for engagement in HIV care through two-way text message check-ins and five face-to-face sessions of peer counseling over 12 months. Peer-delivered face-to-face support counseling occurred at baseline, between 2 and 4 weeks (at visit to CDC where CD4 test result is delivered), as needed, and at months 3, 6 and 9 (in conjunction with scheduled study assessments which are completed by study staff at the CDC sites).

All procedures were approved by Vanderbilt University and China CDC institutional review boards.

Text Messaging Intervention

The two-way text messaging intervention consisted of interactive texted check-ins, which involved sending an inquiry about whether the participant wanted to talk. Over the 12-month period, participants received text messaging check-ins every week for the first three months and then every other week for the remainder of participation in the study with the goal of fostering ongoing engagement and providing a supportive environment during one's first 12 months of living with HIV. Participants were asked to reply to the text message "Want to talk [to their PC]?" with a yes or no within 24 h. The process of sending and receiving the text message was managed first by a computerized/automated system which was then replaced by a person-managed system after concerns emerged in the accuracy of the computerized approach. After the first few months of implementation, the project manager took over sending check-in texts to participants. They then monitored participant responses to identify situations that required opening of a "ticket" for further intervention.

The Ticket Data-Base

A ticketing system was developed for intervention implementation. This system allowed for ongoing monitoring of participant outreach, contacts, and the outcomes of attempted and successful contacts. A 'ticket' was generated for any of the following outcomes from the check-in text: (1) receipt of an indication that the participant *did* want to talk; (2) receipt of a return text that could not be reliably interpreted as a 'yes' or 'no'; or (3) no response to the text within 24-h. Each ticket required action from the peer-counselor to attempt to follow-up and outcomes for each ticket were tracked in a de-identified excel database. Tickets remained "open" until a reasonable determination could close the ticket (e.g., contact made, change of participant's phone number or contact information, unable to reach after 3 attempts and a conversation with the supervisor, etc.). No ticket was generated for responses to text-based outreach that indicate that the participant did *not* want to talk with the PC.

A study de-identified MS Excel® spreadsheet was used to track tickets generated during the intervention period and included the following information: unique study ID, date the message was sent, date ticket was generated, PC assigned to the ticket, reasons for ticket generation, method used by PC to follow-up with participant, date PC reached participant (or number of attempts and date project coordinator closed the ticket), and topics discussed when PC reached participant. For each generated ticket, the PC could have successfully attempted to resolve the open ticket or, for whatever reason, could have failed to try or be able to resolve the issue (row 4 in Fig. 1). Under most conditions, PCs would attempt to resolve the ticket through a phone or face-to-face counseling and discussion session with the participant, and the main content of their discussions were then documented as 'open field texts' within the ticket system (row 5 in Fig. 1).

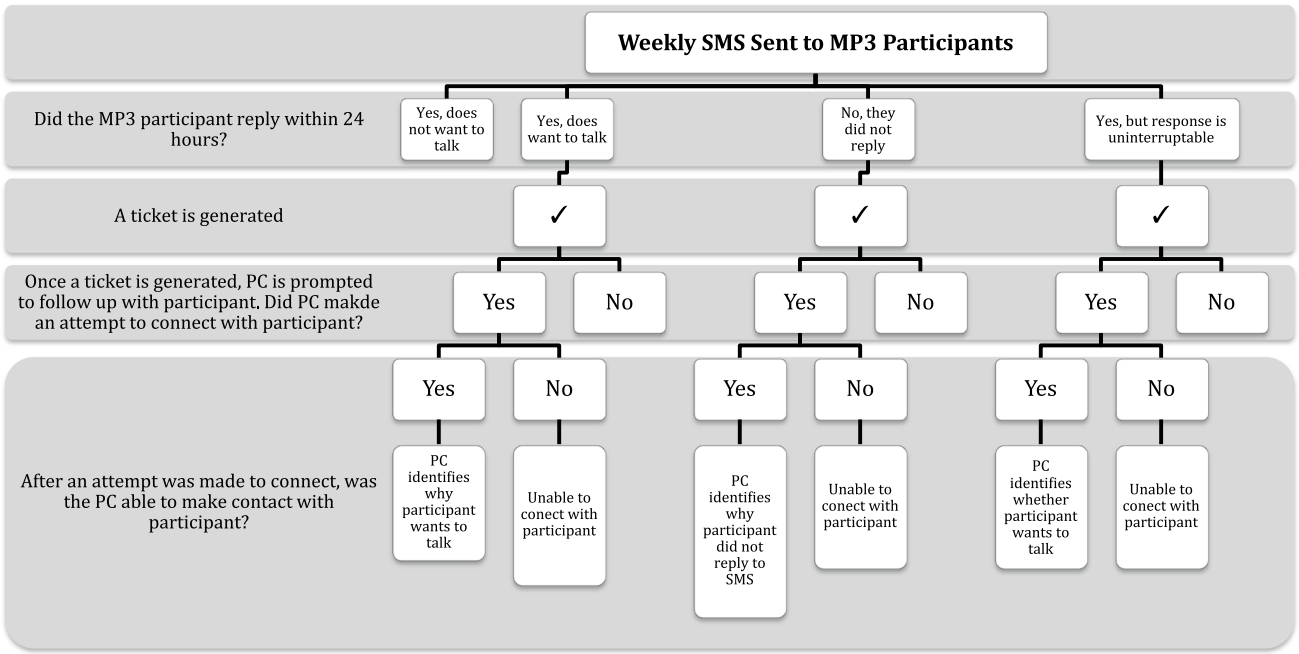

Fig. 1 Text messaging intervention flow—ticket generation process

To assess the utilization of and response to the text messaging intervention among participants in intervention arm, the research team analyzed the tickets generated and outcomes, as well as the open field texts.

Open-Ended Qualitative Data Analysis

Texts were translated from Mandarin to English by one study team member, with 10% of these translations cross-checked by a senior member of the study team. A codebook was generated for sorting discussion topics into main themes, although a single discussion could have multiple content codes if multiple topics were discussed. Thematic data analysis was used in extracting main themes from discussions. The codebook was developed by two research team members, implemented iteratively using the Excel database and revised as needed as new content themes were identified. Any changes to the codebook after initiation of coding required re-coding of any previously compiled data/records. The final compiled Excel database was reviewed by a third research team member. Any discrepancies in interpretations were discussed and resolved by consensus. Thus, the full database contained all tickets, outcomes of follow-up, and coded content of discussions. Additional variables resulting from this review included: (1) utilization and outcomes of outreach (whether and how many times a participant said 'yes' to wanting to talk and related outcomes); and (2) failures to reply (whether and how many times a participant did not reply to a text and why they did not reply).

Quantitative Data Analysis

Using the data generated from the coding process, descriptive analyses were used to characterize overall flow of the text messaging outreach, implementation of follow-up, and coded contents included in follow-up conversations. All statistical analysis was performed using SPSS v.23 (IBM Corp., Armonk, NY, USA).

Results

Study Participants

Of 184 participants who received the text messaging intervention, 6 (3%) never generated a ticket (meaning, they consistently replied 'no' to wanting to talk); 178 (97%) had one or more tickets generated. The mean age of participants was 29 years (standard deviation, 7.1), and most participants had completed college (69%) and were employed full time (82%) (Table 1).

Table 1 Characteristics of 184 MSM participants who received text messaging intervention in China MP3 project

Characteristic	n (%)
Age, year	
18–24	43 (23.4)
25–29	63 (34.2)
30–39	63 (34.2)
40–49	13 (7.1)
≥50	2 (1.1)
Highest educational level attained	
Never attended or primary School	1 (0.5)
Junior middle school	19 (10.3)
High school	15 (8.2)
College	127 (69.0)
Graduate school	22 (12.0)
Employment status	
Employed full time	151 (82.0)
Employed part time	6 (3.3)
Unemployed	9 (4.9)
Student	13 (7.1)
Retired or other	5 (2.7)
Baseline HIV viral load (median, interquartile range), copies/mL	43,600 (21,900, 113,500)

Overview of Responses to Text Messaging Outreach

Text messaging outreach ('want to talk') was sent weekly in the first three months and subsequently tapered to every other week to participants who were enrolled and retained in the intervention arm over 12 months of follow-up. Theoretically, each participant would receive 32 outreach messages if they retained in the study until the end of the intervention (estimated total of 5999 texts). Figure 1 details the classification of responses and outcomes for the check-ins. A total of 1521 tickets were generated (note that no ticket would be generated if a reply of "no" for wanting to talk did not generate a ticket); 348 tickets (23%) were generated because the participant replied 'yes'; 1170 (77%) were because the participant did not respond to the check-in; and 3 (< 1%) were because the participant's reply was uninterpretable. A total of 110 participants (60%) replied 'yes' at least once, and 175 (95%) failed to respond at least once over the course of 12-month intervention. On average, help was requested two times by each participant although this ranged substantially by participant with some people using the service far more often (median 2; range 0–17).

Analysis of 'Yes' Replies

Of the 378 tickets, PCs connected with clients 94% (328 tickets) of the time. When the PC could connect with

participants, the reasons for participants responding with a 'yes' (indicating follow-up by PC was desired) included; (1) participant mistakenly requested contact or noted that all was fine (16%); (2) participant wanted to talk (9%); (3) sought advice on social issues (2%); (4) sought information on physical ailment (11%); (5) sought information on antiretrovirals (ARVs) and side effects (18%); (6) sought information about starting ARVs (12%); (7) sought information about VL/CD4 tests (19%); (8) sought information about transmission (2%); (9) sought information about disclosure (1%); (10) wanted to discuss study logistics (18%); and (11) participant wanted to switch healthcare providers (2%). The most common content discussed with PCs is highlighted in Table 2.

Analysis of Nonresponses (Failure to Reply to Initial Outreach Message)

Of the 1170 nonresponses to text messaging outreach, PCs failed to reach participants for 455 instances (39%). Reasons for the 455 failed attempts to connect with the patient included the following: PCs were not available to place an outreach call (90 instances, 20%); the participant's phone was not in service (239 instances, 52%); and the participant did not answer the PC's call (117 instances, 26%) or were otherwise not available to talk with PC (9 instances, 2%). The vast majority of participants had at least one nonresponse ticket during their participation (n = 175, 95%).

PCs successfully made contact to follow-up on nonresponse for 715 (61%) non-response events. Reasons for participant nonresponse and the content of discussions after contact was made are depicted in Table 3. Furthermore, as noted in Table 3, when the PC could connect with participants, a quarter of the nonresponse events were reportedly due to never having received the outreach text. In some cases, follow-up for a nonresponse created an opportunity to have a targeted discussion. Although most of these discussions focused on study logistics, discussions related to viral load and CD4 tests were the next most common.

Analysis of Uninterpretable Replies

A total of three tickets were generated due to a reply to the initial outreach text that was uninterpretable. An uninterpretable result occurred when a participant's response was something other than a 'yes' or 'no.' The PC followed up and made contact with the clients in all three cases; the respondents immediately asked the PC a question, 2 of which were related to CD4 and VL counts and the other about study logistics.

Discussion

Among the 184 newly diagnosed MSM in Beijing participating in the intervention arm of the China MP3 project, almost all (97%) had at least one interaction with a peer-counselor (PC) that was 'triggered' by the interactive SMS check-in text, with over half of the participants using the check-in text to reply back that they wanted to talk to their PC at some point in their participating in the study. Results suggest that the SMS-based approach was generally feasible to implement, although added systems such as a ticket-tracking approach and added oversight by the project manager were needed to ensure delivery, receipt and responding to texts. Our data, in comparison to the original WelTel project that demonstrated effects on viral load of weekly texted check-ins in Kenya [20], had fewer participant "no reply" events, as well as higher percentages wanting to talk. This may reflect heightened support needs among newly diagnosed MSM or other unique aspects of our implementation of the WelTel approach (i.e., the face-to-face peer counseling component).

In our study, participants received comprehensive education and counseling by peer counselors as part of their

Table 2 Distribution of the reasons for requesting a talk with peer counselor, by ticket (total of 328 tickets) and participant (total of 110 participants who ever replied 'yes')

Summary (*categories not mutually exclusive)	Tickets (328 total) (%)	Participants (110 ever) (%)
Mistakenly requested help and/or all was fine	54 (16)	44 (40)
Seeking information about VL/CD4 tests	61 (19)	41 (37)
Seeking information on ARVs and side effects	60 (18)	41 (37)
Wanted to discuss study logistics	59 (18)	37 (34)
Seeking information about starting ARVs	39 (12)	30 (27)
Seeking information on physical ailment	36 (11)	25 (23)
Wanted to talk	30 (9)	16 (14)
Seeking advice on social issues	6 (2)	6 (5)
Seeking information about switching health care providers	5 (2)	5 (4)
Seeking information about transmission	5 (2)	4 (4)
Seeking information about disclosure	3 (1)	3 (3)

Table 3 Participants did not respond to initial SMS text and PC could connect with participant by ticket (total of 715 tickets) and by participant (total of 175 participants ever)

Summary (categories not mutually exclusive)	Tickets (total 715) (%)	Participants (175 ever) (%)
Reported a message was never received	180 (25)	86 (47)
Phone was out of service	12 (7)	11 (6)
Participant had changed phone numbers	6 (3)	6 (3)
Message received	384 (54)	145 (79)
Forgot to reply	159 (41)	81 (44)
Too busy to reply	68 (18)	46 (25)
Did not notice message	25 (6)	18 (10)
Intentionally ignored message	22 (6)	20 (11)
Deleted the message	14 (4)	14 (8)
Did not know reply was expected	24 (6)	19 (10)
Whether message was received could not be determined from ticket data-base	151 (21)	76 (41)
Used opportunity to explore how client was doing	605 (85)	78 (42)
Exploration indicated all was fine/no help needed	499 (82)	155 (84)
Exploration led to providing specific assistance or information	106 (18)	63 (34)
Advice on social issues	6 (6)	6 (3)
Physical ailment	9 (8)	7 (4)
ARVs and side effects (experiences or lack of side effects, questions about whether certain side effects were possible, resistance, how to purchase medication)	27 (26)	21 (11)
Starting ARVs (refusal to take medication, considering starting ART, fears around taking ART, applying for drugs with partner)	26 (24)	18 (10)
VL/CD4 tests (worried and stressed about tests, asking about test results, reminders to pick up test reports and medications, connecting with patients when visiting clinic for test reports, waiting for reports to decide whether to take medication)	40 (38)	33 (18)
Transmission	2 (2)	2 (1)
Disclosure	4 (4)	4 (2)
Study logistics (reminders to respond to future messages, making appointments for follow-ups in clinic, explanations of the content of messages, wanting to quit the study, expressing interest in the study)	59 (56)	44 (24)
Switching healthcare providers	2 (2)	2 (1)

comprehensive intervention package. Participants could contact peer counselors or treatment centers as needed. The weekly texted check-ins (which tapered down to monthly over time) were an additional intervention feature. Even in the context of consistent, optimized face to face visits with peer counselors, and access to contact information and service locations, newly diagnosed MSM still used the "check-ins" to ask additional questions or share concerns between visits. Texted check-ins may offer unique opportunities that are distinct from other services or resources. Recent evaluations of "active ingredients" in SMS texted check-in interventions support the potential unique benefits of receiving messages from providers or counselors in the context of one's own daily life [21]. While our results do not evaluate impact of using texted check-ins, the patterns of use do suggest that participants were willing and able to use the reply function and related follow-up to gain additional information or support.

In implementing the texted check-ins, there was a frequent occurrence of nonresponse- where participants failed to reply back to the check-in within 24-h. Almost all participants were contacted at some point because of a failure to respond to the outreach text within the 24-h period, following-up on failures to reply to a check-in text was a large part of the total outreach efforts. Although this may have initially been influenced by participant confusion over study procedures and expectations, other reasons included changing phone numbers, phone out of service, or simply forgetting to reply to the outreach message. Importantly, review of contact logs indicated that in most cases, these events were used productively, with nearly half of participants contacted initially because of a failure to respond to the check-in subsequently engaging in information gathering and supportive discussions when their peer-counselors. From these results, it appears potentially advantageous to respond to nonresponse events,

as they did generate discourse that otherwise may have been missed using a procedure where responses were not required.

Limitations in the current work include use of open-ended descriptions of conversations with participants collected only from the perspective of the PCs. Participants may have characterized the main content of their discussions differently. Additionally, it is not known if discussion of certain topics or sheer number of discussions with PCs related to improved ART access, adherence or related outcomes. The parent study is examining the impact of the intervention on primary outcome measures. The results presented in the current analysis can only speak to the implementation of the texted portion of the intervention. Additional research is needed to establish the potential impact of receiving support for specific issues and resolution of these issues, and whether the specific two-way check-in messaging strategy or ticketing tracking system provided unique advantage over alternatives. Given the literature in support of two-way messaging over one-way (non-interactive) messaging [16, 20], we believe future interventions would benefit from use of interactive texting.

The ticketing system developed to facilitate and monitor implementation of the SMS part of the China MP3 intervention proved to be an important component for organizing what can become a complex system of "tickets" transitioning from open (text replies or outcomes requiring some kind of response or follow-up) to closed (resolved outreach or texts not requiring follow-up) assigned to multiple counselors across different participants. During implementation, the system assisted in supervision of texted check-ins and related follow-up and after the intervention, the system produced a database that could be qualitatively and quantitatively evaluated. Use of similar systems is highly recommended for interventions relying on two-way, interactive check-in texts.

The current work details the implementation of the SMS portion of this intervention and offers insights into overall utilization patterns and dominant content. Although PCs were near peers in most regards, we did not see a high frequency of content focused on social issues or disclosure which would have captured some of the stigma and adjustment issues reported by MSM in Beijing living with HIV in our earlier work [15]. Providing ART specific information and guidance appeared more relevant in participant concerns at this time of dynamic expansion of ART eligibility in China. The high engagement of MSM in response to SMS-text based outreach suggests the important future role of SMS texting in assisting newly diagnosed MSM entering HIV-care.

Acknowledgements The authors acknowledge the contributions of the full China MP3 team and the participants who offered their time and insights for this project.

Funding This work was supported by the National Institute of Allergy and Infectious Diseases of the National Institutes of Health under Award Numbers R01AI094562 and R34AI091446. The funder had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Compliance with Ethical Standards

Conflict of interest KRA had a grant with Gilead Sciences through the University of Michigan (completed 2017). No other authors have conflicts of interest with the work presented.

Ethical Approval All research activities were approved by Vanderbilt University abd China CDC. The parent grant (China MP3) is registered with clinical trials (Clinical Trials NCT01904877).

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