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Lessons for rectal microbicide development from an acceptability trial of a placebo gel applied prior to receptive anal intercourse

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Abstract

Rectal microbicides, formulated as a gel to be applied before and/or after intercourse, are promising HIV prevention agents and are now in Phase II trials. However, both an optimal formulation and a practical delivery system are needed to ensure that the target population will use the product once efficacy is demonstrated. The precise dynamics of lubricant application by gay and bisexual men who practice anal sex and the qualities they seek in these products are underexplored. As part of a Phase I microbicide acceptability and adherence study conducted in one Puerto Rican and two continental U.S. cities, we recruited 124 young men who have sex with men (YMSM) with a history of unprotected receptive anal intercourse (RAI) and provided them with 40 rectal applicators containing a placebo gel to use prior to RAI during a 12-week period as a proxy for an eventual rectal microbicide. Ninety-five YMSM completed the trial. Their varied preferences as to product viscosity, durability, residue, and mode of application provide important lessons for the design of a product that will be satisfactory to users. Despite many reservations, the participants used the product frequently and found ways to overcome a range of obstacles. A successful rectal microbicide product may need to be presented in a range of viscosities to attract a broad client base.

Keywords

microbicides; anal intercourse; lubricants; MSM

INTRODUCTION

Interest is growing in the possibility of developing an HIV microbicide gel that would be applied before or after anal intercourse (MacGowan, 2011); in fact, some Phase II clinical trials are now underway (Cranston et al., 2015). This would be an important additional HIV prevention tool, especially for gay and other men who have sex with men (MSM) who account for a large number of new infections in many countries (van Griensven & van Wijngaarden, 2010; Beyrer et al., 2012). Assessing in early phase trials how these men feel about the possibility of a rectal microbicide and their likelihood to use it is paramount to the ultimate success of the trials and of the product itself given that a microbicide can only work if it is put to use (Tolley and Severy, 2006).

People often employ a variety of commercial products designed to ease penetration and make anal intercourse more pleasurable. Many MSM are accustomed to applying an anal product before penetration (Clark et al., 2013; Marks et al., 2000; Javanbakht, Murphy, Gorbach, LeBlanc, and Pickett, 2010; Javanbakht, Stahlman, Pickett, LeBlanc, and Gorbach, 2014), and among those queried in prior microbicide research, the great majority reported that they were not bothered by the interruption of the sexual encounter that such use entailed (Pines et al., 2014). However, engineering a product that would both lubricate the anus and also protect the entire rectal mucosa presents considerable challenges given the distinct functions that would be required of either the product itself or its delivery mechanism.

A rectal microbicide that could double as a sexual lubricant would be highly desirable. The public health field has dedicated enormous effort to the promotion of condom use for anal intercourse with only partial success given the disruptive, pleasure-inhibiting, or annoying aspects of its use in an intimate encounter (Carballo-Diéguez et al., 2011). By contrast, use of a lubricating gel or cream already forms part of many men's sexual routines; in fact, consistent lubricant use may be more frequent in this population than consistent condom use (Javanbakht et al., 2010). Incorporating an HIV-protective agent into one or more lubricants could generate a significant health benefit that might motivate men to use HIV-prevention gels even if the type of product or its delivery method were unfamiliar.

Despite years of attention to anal intercourse among MSM in the HIV field, surprisingly little is known about their subjective experience of the lubricants that they frequently use (Butler, Osmond, Graves Jones and Martin, 2009). While there is recent research on how gay and bisexual men react to rectal gels and microbicide delivery systems (Carballo-Diéguez et al., 2014a; Pines et al., 2013; Galea et al., 2014), the association between men's expressed acceptance of a product and their ongoing use of it, either in clinical trials or as part of a permanent sexual repertoire, is still in question (Coly and Gorbach, 2008). Marks et al. (2000) found that potential MSM users of a microbicide have "stringent standards," that is, they expect high HIV prevention efficacy from any product they would consider using. In addition, there is evidence that distinct user populations react quite differently to potential product characteristics, suggesting that development of a single, ideal microbicide product may not be realistic (Carballo-Diéguez et al., 2008; 2014b; Giguere et al., 2012; Jones et al., 2008; Kinsler et al., 2010; Kinsler et al., 2012).

Our study explored how men reacted to the use of a placebo gel that mimicked a microbicide and how the experiences using the gel compared to their prior use of lubricating agents for receptive anal intercourse (RAI). Although the instructions on gel use directed participants to insert it into the rectal compartment and participants knew that it had no HIV protective qualities, their statements about the experience using the product shed light on how a microbicide gel might be perceived by men accustomed to the use of anal lubricants.

We also sought to explore what elements MSM find most pleasurable when using lubricants for anal sex with male partners as well as the variety of functions they seek in these products and the relative advantages or drawbacks of different kinds to inform rectal microbicide development.

METHODS

Project GEL was a study in three stages that culminated in a Phase I acceptability trial. For the first stage, 226 YMSM were recruited from gay venues and through social media, gay dating sites and smartphone applications in Boston, Pittsburgh and San Juan between 2010 and 2012 to assess prevalence of STIs and anal pathologies among YMSM. (Further details about screening for study participation can be found in Carballo-Diéguez et al., 2014a and 2014b). Men who joined the study were 18 to 30 years old, engaged in sex with male partners, were willing to undergo a complete physical exam, including an anorectal screening, were HIV-negative, and were willing to answer questions about their medical and sexual history.

Of the 226 men, 124 men (Boston n=38, Pittsburgh n=38, San Juan n=48) who were HIV- and STI-free at screening and reported unprotected, receptive anal intercourse (RAI) in the prior three months on at least one occasion were enrolled in the second stage of the study. In this stage they were asked to use a placebo gel (hydroxyethylcellulose or HEC), manufactured by DPT Laboratories, Ltd. (San Antonio, TX), rectally prior to each occasion of anal penetration for the next three months as a proxy for a possible rectal microbicide. Participants were told that the study was to examine how they felt about “using a placebo gel in their rectum prior to anal sex.” They received applicators containing the gel along with written instructions and drawings showing in detail how to insert the product intra-rectally. At the conclusion of this phase of the study, they were asked how the gel compared to “other products you have used rectally.”

The 95 men who completed this second study stage and participated in a qualitative exit interview (Boston n=26, Pittsburgh n=28, San Juan n=41) constitute the subsample from which the presented results are derived. The only significant difference between the 95 who completed the second study stage and the 29 who did not was educational attainment, which was higher among the former group ($M=4.55$, $SD=1.13$ vs. $M=3.86$, $SD=1.06$; $t = -2.90$, $df = 122$, $p = .004$). Attrition was lower in the San Juan site (15%) than in either Pittsburgh (26%) or Boston (32%). The third stage was a Phase I trial of the reduced-glycerin formulation of tenofovir 1% gel among a smaller subsample of this group. In this report, we focus only on data collected during the second stage.

The study was approved by the Institutional Review Board (IRB) of the [removed for review] as well as the participating trial sites.

Product & three-month trial

After medical clearance, participants received 20 rectal applicators filled with HEC gel and were instructed to assemble the pre-filled applicator and lubricate it with a dime-sized portion of a commercial lubricant provided to them separately to the outside of the applicator barrel. They were then to lie on one side, slide the tip of the applicator into the rectum 2-3 inches, push the plunger to release the gel and withdraw the applicator.

This procedure was to occur no more than 90 minutes prior to “each time you have receptive anal sex.” Although the study gel was not presented to them as an anal lubricant to facilitate sexual intercourse, the explicit association between sexual episodes and gel use is consistent with the original motivation for formulating a rectal microbicide that could be incorporated into men’s familiar sexual routines. As will be seen in the interviews cited below, many participants considered the gel’s potential lubricating properties when discussing their experiences with it.

During the next six weeks, participants were asked to report on their sexual behavior and gel use via an Interactive Voice Response System (IVRS). Participants were asked by the IVRS to record anal intercourse occasions, use of the gel, condom use, and partner reactions to the gel use, if any. They received \$1 per reporting session.

At the end of that period, they returned and were provided with another supply of 20 rectal applicators. After 12 weeks all participants returned for a final visit including a quantitative assessment and an interview by videoconference. Adherence to product use during this stage and an evaluation of the applicator used have been previously reported (Carballo-Diéguez et al., 2014b).

Assessments

Participants completed a computer-assisted self-interview (CASI) at baseline that included demographic information (age, education, income, employment status, race/ethnicity and sexual identity). They were asked about sexual practices, types of male and female partners, and lubricant use preferences.

At follow-up, they completed a second CASI and were asked to rate the gel on a scale of 1 (“disliked very much”) to 10 (“liked very much”) for color, taste, smell, consistency, and their overall reaction to it as well as how it felt inside the rectum immediately after application and 30 minutes later. They were also asked how much they liked or disliked the applicator and the application process, how easy or difficult application was, and whether they experienced leakage, soiling, bloating, gassiness, stomach cramps, urge to have a bowel movement, pain or trauma. In each case, they rated each element on a 10-point scale as well as how bothered they were by each of these symptoms or reactions.

In addition, participants were asked to rate on a 10-point scale how it felt to use the gel during sex, how the gel affected their sexual practices, and self and partner sexual

satisfaction. They were asked whether their sexual experience was better, worse, or unchanged with gel use, if it made penetration easier, if sex had to be interrupted to apply it, and if so, how bothered they were by the interruption.

Finally, they were asked how likely they would be to use a similar product in the future if it had protective qualities and what they would change about the flavor and consistency of the gel, its packaging or the application process.

In the final qualitative interviews, all participants were asked to describe their experiences using the gel including a general question (“What was it like to use the gel during the past three months?”) and probes on any problems encountered, the impact of gel use on spontaneity or pleasure in the sexual encounter (both overall and for any specific incident they could recall), and how the study gel compared to other rectal products in terms of “ease or difficulty of use.” They were also asked to describe any perceived learning curve that made using the gel easier with practice. Even if participants did not volunteer critical comments, they were asked to elaborate on what they did and did not like about the product.

Finally, they were asked, “If a gel like the one you used were found to be an effective microbicide, how likely would you be to use it every time you have receptive anal intercourse and why?” Interviews lasted approximately 45 minutes to one hour and were conducted in English or Spanish based on participant preference.

Compensation

Participants received \$50 compensation for each of three study visits, \$1 per returned applicator (up to \$20) at each follow-up visit, up to \$60 for daily calls made to the IVRS, plus \$50 for the final interview conducted by videoconference. Those who completed all procedures of the second study stage thus could receive up to \$300.

Data Analysis

Descriptive statistics were generated for quantitative data. Chi-square and t-tests were used to compare those who completed vs. those who dropped out of this stage of the study.

All interviews were taped and transcribed verbatim. The team, including the interviewer, project manager and project principal investigator, developed a codebook that incorporated categories and themes from the interview guide. The codebook included definitions, inclusion and exclusion criteria, and examples of passages for inclusion. To validate and finalize the codebook, three researchers coded an initial set of three transcripts independently and then compared the codes to assess concordance. Any discrepancies were discussed until consensus was reached, and the codebook was modified, including refining of inclusion criteria and adding new codes. Four researchers coded the remaining transcripts independently using QSR NVivo 10.0 software (QSR International, Doncaster, Australia, 2013). Every fifth transcript was coded in pairs to ensure intercoder agreement. Inter-coder discrepancies were resolved through discussion until consensus was reached. Spot checks consistently yielded over 90% intercoder agreement. The material gathered under the codes “gel use,” “lubricant use,” “sexual encounter,” and “negotiation” were reviewed for the present analysis. Coding reports were analyzed using conventional content analysis (Hsieh

& Shannon, 2005), summarized and discussed by team members. The first author selected quotes that contributed to understanding participants' motivations and experiences and, when necessary, translated them from Spanish into English.

RESULTS

Demographics

Of the 124 men enrolled in the second stage of the study, one participant seroconverted before his last scheduled visit, and 28 either withdrew from the study or were lost to follow-up, leaving 95 who completed follow-up. Table 1 presents their demographic characteristics. Their mean age was 23 years, and almost 90% had completed some college education. Most were working, studying, or both; however, 12% were neither employed nor in school. Most were either African-American or Hispanic and identified as gay.

Lubricant use prior to study enrollment

As shown in Table 2, at baseline nearly all participants (96%) reported that they used commercial lubricants at least sometimes. Those who reported inconsistent or no use ($n=42$, 44%) gave three main reasons: many used saliva (79%), about half (48%) said they did not always have a lubricant on hand, and one third (33%) reported using lubricated condoms. (Totals in this and other questions sum to more than 100% due to the possibility of multiple responses.) Of those who reported lubricant use, water-based products were the most popular (88% had used them), followed by silicone-based products (33%). A minority of 14% reported using oil-based lubricants. Approximately half of the participants said they preferred products without flavor (41%), color (52%), scent (47%); most of the others reported no preferences on these characteristics.

The dynamics of lubricant use in terms of who applied the product and when and where it was applied also showed some variation, as outlined in Table 2. In most cases, gel application was a collaborative activity involving both partners (79%), and gel was applied during sex but before penetration took place (81%). Practically all participants (97%) reported applying the lubricant around the anus, and most (87%) also applied it directly on the partner's penis; in addition, two thirds (65%) also reported application into the anal canal. Although over half of lubricant users (55%) acknowledged that applying lubricant interrupted sex, almost none (3%) reported being bothered by it.

Acceptability

Table 3 presents the participants' reactions to their use of the HEC gel during the three-month study period. The mean overall rating of the HEC gel was 7.71 on a 10-point scale (10 = "liked very much") with reactions to other factors, including performance with and without condoms, in a similar range. Although participants reported a variety of drawbacks to the gel such as leakage (24%), stickiness (23%), a cold sensation in the anus (38%), and interruption of the sexual encounter to apply the gel (27%), when asked how bothered they were by these reactions, participants consistently rated the degree of discomfort caused as low (2.33 to 4.52 on a 10-point scale (1 = not at all, 10 = very much). Three quarters of the

participants found penetration “somewhat” (49%) or “much” (27%) easier with the gel than without it.

Table 4 shows the likelihood to use a rectal microbicide as reported by participants at baseline (before having had the chance to use the HEC gel) and again at follow up (after three months of opportunities to use HEC). The overall mean measure of “likelihood to use” a microbicide gel like HEC for all RAI occasions was high at follow-up (8.51 to 9.53 depending on a range of hypothetical circumstances on a scale of 1 to 10, with 10 being very likely to use) without significant changes from the hypothetical likelihood reported at baseline (9.29). The only exception was the response to a question of likelihood to use a gel that required a 30-minute waiting period before sex, for which the mean dropped to 6.77. A majority (56%) said they would be willing to spend about as much per sexual occasion on a microbicide gel as the cost of a condom.

The qualitative exit interviews helped to provide further insights into the participants’ experience using HEC during the trial. Results are summarized below.

Product viscosity

Almost all participants referred to how watery or thick the gel felt as a key element of their enjoyment of the product and their willingness to use a similar one in the future. In the survey participants’ main preferences were for somewhat liquid gels (39%), followed by neither liquid nor thick (29%), or somewhat thick (25%). Only a few wanted a very liquid gel (8%). Although participants were instructed to insert the gel into the rectal compartment, their comments demonstrated that they examined the contents of the applicator and compared it to the anal lubricants that they habitually employed. Opinions were fairly even divided: some said they preferred a product thicker than the one used in the study while others favored a more liquid product; a third group was satisfied with the consistency of the gel provided.

Um, I prefer a jelly compared to a gel or liquid... I prefer something, you know, KY or something, like something really thick, you know, like a jelly. So on a scale of 1-10, I give it a 5. [African American, 28, Pittsburgh]

It’s not as smooth, it’s not as watery, slippery and—as, the lube that I use. Um, I think the consistency’s a little too thick. And, I don’t like, um, it’s too creamy, it’s not as, as slippery as the lube would be, at least for me. I like something to be more on the watery side. [Hispanic, 26, San Juan]

I have used other lubricants that are quite watery. Quite wet. That come in bottles—they drip. They run on you. This one at least just stays there. Right where you put it, it stays. [Hispanic, 24, San Juan]

Drying out, stickiness

The product’s viscosity was important not just for the pleasurable sensations produced by the thickness or watery quality of the product but also for how long it lasted during intercourse as well as how sticky it felt during or after use. Once again, opinions were

divided on each of these topics although in general the placebo gel received slightly more critical than positive reviews.

So I personally would prefer something that's a bit less viscous. I think that would also help with the one issue that my ex and I had with it starting to get sticky.

[African American, 23, Pittsburgh]

I actually liked the gel better... I felt like it stayed "lube-ier" longer. It never felt sticky or anything. [Hispanic, 23, Boston]

Whether the gel lasted long enough for a comfortable sexual experience was also important, a factor influenced by the unfamiliar application method of inserting the gel deep into the rectal compartment rather than applied externally.

The gel actually held up really well. It actually was better than most, like a KY or even like an Astroglide lube. I think it didn't get sticky, and it didn't absorb into our skin either. So I think it was great. [Caucasian, 27, Boston]

You know, its resistance is not very good. When you use it, you might get lubrication for the next 15 minutes. After that, it's dead. [Hispanic, 25, San Juan]

Some participants who found that the gel dried out too quickly relied on a second product to achieve the desired effect, thereby resolving the problem of the lack of external lubrication when the gel was applied as designed.

The very first time that I used it, I did notice that it got a little bit dry after, uh, how do I say this? After so much friction. So more lube had to be applied, and that's whenever I would use one of my own lubes. [Caucasian, 21, Pittsburgh]

Residue

Participants largely agreed on another important aspect of a lubricating gel: how easily it washed off after use. The placebo gel generally was given high marks on this trait as it did not cling to the hands or produce an oily residue.

When you're done and go to wash up and bathe, there's like no residue left over...

The other gels, like, they stick, at least what I've used, it's as if you had oil down there, you have to scrub a lot. [Hispanic, 24, San Juan]

Durability

The desire for a long-lasting product that would retain its favorable characteristics was related to the interruption of sex that would occur if reapplication were required.

It [placebo gel] lasts a lot longer, and it's extremely slick. So you don't have to keep reapplying it every few minutes. It doesn't get sticky. So it's better for the long haul, I think. [Caucasian #1, 27, Pittsburgh]

And there was a ton of—there like, was a lot more gel in the applicator than I thought there was going to be. But maybe that pays off, because then you don't need to reapply it a second time. [Caucasian, 23, Boston]

... after the gel it was so much better. I mean before [using] the gel, the duration of the penetration was so much lower. It was more painful for me. And it was less comfort. [Asian/Pacific Islander, 25, Boston]

The bad sides of the current gel was, it actually—like, if I can say that that was a bad side, that I had to reapply it. And you know, like as a result, if you apply a little bit more, then yeah, it becomes a little bit sticky. [Caucasian #2, 27, Pittsburgh]

Pros and cons of rectal insertion over anal application

For most participants, the insertion device with a plunger were an unusual method of rectal delivery, and a number of problems arose with it as discussed in detail elsewhere (Carballo-Diéguez et al., 2014b). However, while it often took practice for men to get used to the new approach, some commented that direct insertion deep into the rectum eliminated “mess.”

It was a lot less messy to apply than others, a lot less messy. You didn't drip it all over yourself or everywhere, it wasn't all over your hand... and we all know that that stuff does not come off as easy as it's supposed to, ... who's going to be like all right here, I'm going to get this all over you, and then wait a minute while I run to the bathroom and wash my hands? No, that doesn't happen, so then you just have lube hands. [Caucasian, 21, Boston]

And since this gel goes inside, then inside is more lubricated. And so also when the person pulls out his penis, it also comes out lubricated. And that's more comfortable. [Hispanic, 24, San Juan]

However, for others the deep insertion without lubricating the perianal area or the partner's penis was a disadvantage:

If you're not lubricated on the outside and you are lubricated inside, then it's a bit difficult when it enters. [Hispanic, 21, San Juan]

In summary, men using the placebo gel noted that a sexual lubricant for anal intercourse has two separate functions: initial penetration focusing on the anus and the later stimulating movements that involve the entire rectum. These functions represent distinct product goals. Since most lubricants are now designed for application around or in the anal canal or directly on the penis, a lubricant inserted deep into the rectum could be attractive for one or both partners but does not solve the problem of dryness or friction at the site of penetration.

One participant solved the dual use dilemma by adjusting the application procedure:

I mean, it's more comfortable putting the gel inside than outside, but also both are good. I mean, applying the gel or the lubricant that you're going to use on my partner's penis so that then at first when he enters you, it also doesn't hurt... I didn't put it on the penis but left a little for the outside area. [Hispanic, 20, San Juan]

Others just accepted that there were two different functions involved and planned accordingly:

Interviewer: What about, for example, other lubricants?

Respondent: Um, baby oil. But that was only during intercourse, after I have applied the gel... I put the gel in first. And then, um, before the actual act of intercourse, we used baby oil for lubrication.

[African American, 20, Pittsburgh]

Despite descriptions of this sort about complications involved in using the placebo gel, men sometimes noted that even their favorite commercial lubricants don't always work just as they'd like:

Even with lubed condoms, it's still not sometimes enough... oftentimes, you know, you put lube on the condom and then on the outside of the rectum, and even then it takes a few kind of thrusts to get the lube [inaudible] penis and make it kind of slippery and smooth and unpainful. [Caucasian, 26, Boston]

Getting used to the gel—a learning curve

Although men did not agree about the ease of using the gel product given its unusual packaging and delivery system—in comparison to the commercial lubricants with which they were more familiar—they sometimes found that a couple of practice attempts enabled them to use the product smoothly. The unfamiliarity of the procedure, experimentation about how much product to use, and any “mood-killer” interruptions that might occur generally did not inhibit gel use.

Sometimes I would vary how much I would use in it if I wanted to use the whole one or maybe half, um, and then maybe use it externally on my partner and on me, um, and so we tried variations of that. [Mixed race, 24, Boston]

At first it was kind of weird, because, I mean obviously, like, I'm squirting something into my rectum. But I mean, like I said, I got used to it. I wish that this stuff was, like, available, like in the stores because I actually liked it quite a bit. [Caucasian, 30, Boston]

DISCUSSION

Microbicides designed for rectal use could reduce risks substantially for HIV transmission among MSM. Most participants in our study reported using commercial sexual lubricants, with water-based lubricants being the most popular. Given that water-based lubricants are recommended because they do not affect condom integrity, a microbicide included in a water-based lubricant would be desirable.

Rectal microbicide development began with the idea that the product could also serve as a lubricant. Although the study gel provided to participants in this study was a rectally delivered product not specifically designed to lubricate the anal area for intercourse, it was clearly judged by participants for its lubricating qualities or shortcomings. Their reactions to it suggest that gels intended for rectal insertion will be judged similarly. Therefore, further development should take into account the participants' inclinations to see a dual purpose in the gel—both for anal lubrication and rectal insertion—rather than simply a protective medication.

In that regard, the fact that the population in question already is familiar with the kinds of lubricant gels or liquids that might be utilized as a delivery vehicle is crucial. But the devil, as usual, is in the details. Colorless, scentless and flavorless products could have higher market penetration. Viscosity and the related factor of durability of a lubricating product subject to drying out are key considerations, and our exploratory conversations with users participating in a placebo-based acceptability trial suggest that no single formulation will satisfy everyone. A successful product probably would have to be presented in a range of at least two or possibly three consistencies to attract a broad client base.

It is noteworthy that commercial lubricants marketed for anal sex currently do not employ a category system equivalent to that used, for example, by hair gel manufacturers (firm hold, styling gel, silky, etc.) At best, products might be labeled “thick” or “thin” amid a host of other promotional qualities, such as, “organic ingredients,” “warming,” or “vegan formula.” Given that viscosity can be measured numerically, consumers could become accustomed to identifying the grade they find most desirable for their microbicide product through the use of standardized values to guide their purchases.

Because both partners often apply the lubricant, the ideal microbicide should appeal to both in its application method as well as its formulation. Timing is another important consideration. A large majority (81%) of our sample reported that they apply lubricant during sex, just before penetration takes place. If the microbicide gel needs to be present in the rectal mucosa for some time to become effective, users would have to incorporate a change in their typical practices. The unique drop in the likelihood-to-use average for a gel with a waiting requirement of this sort suggests that some potential users would be lost in this case. Thus, a microbicide product, to be successful as a rectal lubricant, might need to be effective almost instantly.

A rectal microbicide also may require an additional unfamiliar procedure such as the use of an applicator to deliver the product intrarectally and fully cover the mucosa. A rectal gel inserted with an applicator would introduce a portability problem, especially for sexually-active individuals meeting partners away from home. In addition, men who typically apply sexual lubricant only on the anus or the penis to facilitate penetration (as was the case for one-third of our sample—see Table 2) would have to incorporate an additional step of assembling the applicator. These factors are crucial for the public health goal of placing an HIV prevention product firmly within the sexual repertoire of men who practice anal intercourse.

At the same time, two thirds of our sample reported that they already apply lubricant intrarectally. Thus, developing a microbicide that could be applied inside the rectum without an applicator would build on a practice already common for many men.

Participants often reported adjusting their sexual routines to accommodate the gel’s properties, and sometimes these variations included doubling up with a second product. This practice requires further study as it might weaken or neutralize the gel’s protective potential given the many possible interactions with other lubricants. Alternatively, the prospect that a microbicide gel might have to be used together with a second product constitutes a drawback

that may undermine its practicality and efficacy. Instructions provided to users of a rectal microbicide could suggest application of a few drops of the gel on the perianal area to facilitate insertion and then the rest well inside the rectum for full protection of the rectal compartment; yet, the challenge will be to ensure that a sufficient dose of the microbicide is delivered inside the rectum while accommodating the users' practical demands.

While this procedure may sound unduly demanding, Pines et al. (2014) found in a study of 168 HIV-negative men in Los Angeles that nearly all respondents reported applying lubricant at various places. They also found that while around half their participants said that lubricant application "interrupted sex," only 3% said they were annoyed by the interruption, a finding almost exactly consistent with our study. These reports reinforce the impression that obstacles to use of a protective microbicide gel are not insurmountable.

Further on the positive side, intrarectal application that does not result in leaking introduces the possibility of privatizing lubricant use since it could occur prior to sex and thus would not require a partner's active cooperation nor entail the interruption of the sexual encounter. As some users already add other substances such as saliva or water to sexual lubricants (Javanbakht, Murphy, Gorbach, LeBlanc, & Pickett, 2010), the inclusion of a microbicide product might not seem extraordinary to them.

Limitations

Participants tended to have a high level of education that may not be representative of other YMSM; thus their experience may not be representative of this population. Furthermore, our participants knew that HEC had no protective properties against disease, which may have influenced their evaluations.

Nevertheless, despite the variety of critical observations on the placebo product by users, self-reported intentions to use a rectal microbicide with similar characteristics that theoretically did offer protection against HIV remained high, and actual use of the placebo product was above 80% (authors, 2014a). This suggests that users would be willing to work with a protective product notwithstanding its possible shortcomings. While such expressions of intent are inconclusive, the participants were all individuals with inconsistent condom use and may have had a heightened awareness of risk that would dispose them favorably to gel use despite the possible annoyances. Careful attention to the dynamics of sexual lubricant use will enhance the likelihood that a gel product eventually found to have the needed biomedical properties will be deployed as intended.

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Table 1

Demographic characteristics (N=95)

Demographics			
	Mean	SD	Range
Age	23.2	3.2	18-30
Education ¹	4.6	1.1	2-7
Annual income	\$15,260	16,163	\$0-68,000
Currently working full- or part-time ²	60		63%
Currently in school full- or part-time ²	47		50%
Race/Ethnicity			
White/European American	34		36%
Latino/Hispanic	46		48%
Black/African American	9		10%
Mixed/Other	6		6%
Sexual identity self-label			
Gay/Homosexual	81		86%
Bisexual	13		14%

¹ Measured on a 7-point scale (4=partial college).² 23 participants were both working and in school.

Table 2

Lubricant use for receptive anal intercourse (RAI) at baseline (n = 95)

<i>Commercial lubricant use for RAI</i>	n	%
Always	53	56%
Sometimes	38	40%
Never	4	4%
<i>Reasons for not using lubricant for RAI¹</i>	Never/Sometimes (n=42)	
Used saliva	33	79%
Lubricant not available	20	48%
Used condoms with lubricant	14	33%
In a rush	9	21%
Prefer dry sex	7	17%
<i>Types of lubricant used¹</i>	Sometimes/Always (n=91) ²	
Water-based	80	88%
Silicon-based	30	33%
Oil-based	13	14%
<i>Prefer lubricant with...</i>		
No flavor	37	41%
Flavor does not matter	48	53%
No color/transparent	47	52%
Color does not matter	43	47%
Unscented	43	47%
Scent does not matter	44	48%
<i>Viscosity preference</i>		
Very liquid	7	8%
Somewhat liquid	35	39%
Neither liquid nor thick	26	29%
Somewhat thick	23	25%
Very thick	0	0%
<i>Who applies the lubricant?</i>		
Self	8	9%
Partner	11	12%
Both	72	79%
<i>When is lubricant first applied</i>		
During sex but before penetration	74	81%
Before any sexual contact	17	19%
<i>During RAI, is lubricant applied...¹</i>		
Around your anus	88	97%

<i>Commercial lubricant use for RAI</i>	n	%
Directly on partners penis	79	87%
Inside your rectum	59	65%
On the outside of the condom	55	60%
Inside the condom	18	20%
<i>Does application of lubricant interrupt sex?</i>		
It does not.	38	42%
It does but does not bother me.	50	55%
It does and bothers me.	3	3%

¹ Participants could select more than one answer.

² Ns may not always sum to the expected value due to missing data. Percents are based on Ns without missing data.

Table 3HEC gel acceptability (n = 95)¹

Ratings by participants	M	SD
Overall liking of the gel ²	7.71	2.15
Color	8.54	2.12
Taste	4.00	2.06
Scent	8.00	1.92
Consistency	7.55	2.53
How gel felt immediately after inserting it	7.89	2.12
How gel felt 30 mins after inserting it	7.68	2.14
How much liked feeling of gel during RAI	7.84	2.22
How sexually satisfied using gel during RAI	7.96	2.18
How much liked gel with condoms	8.12	1.90
How much liked gel without condoms	8.21	2.04
	N ¹	%
Experienced gel leakage		
No leakage	69	76%
Some	21	23%
A lot	1	1%
How much bothered by leakage ² (M, SD)	4.09	2.31
Gel felt cold after insertion in rectum	35	38%
How much bothered by gel feeling cold ² (M, SD)	2.86	2.07
Gel felt sticky	21	23%
How much bothered by gel feeling sticky ² (M, SD)	4.52	3.19
Had to interrupt sex to apply gel	25	27%
How much bothered by having to interrupt sex ² (M, SD)	2.33	2.63
RAI experience with gel compared to without		
Better	34	37%
Worse	3	3%
No difference	55	60%
Penetration ease while using gel		
Much easier	24	27%
Somewhat easier	44	49%
Not easier	21	24%
Used less than specified amount of gel	0	0%
Would use gel if half as much were required	76	82%
Would use gel if twice as much were required	75	81%

¹Ns may not always sum to the expected value due to missing data. Percents are based on those that have non-missing data.

²Ratings based on 10-point scale with 10 = “liked very much”

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Table 4

Future likelihood to use a rectal microbicide

	Baseline (n=95)		Follow-up (n=95)	
	M	SD	M	SD
Likelihood to use gel every RAI occasion	9.29	1.23		
Likelihood to use gel every RAI occasion with one-night-stand			9.20	1.75
Likelihood to use gel every RAI occasion with other partners			8.87	2.11
Likelihood to use gel every RAI occasion with lover			8.51	2.58
Likelihood to use gel if using alcohol or drugs	8.57	1.86	7.44	2.76
Likelihood to use when don't use condoms			9.53	1.31
Likelihood to use if had to wait 30 mins before RAI			6.77	3.10
<i>How much would you be willing to spend per sexual occasion?</i>			N	%
Approximately same as cost of condoms			53	56%
Double cost of condoms			21	22%
Less than cost of condoms			10	11%
Three times cost of condoms			4	4%
Other			7	7%