ClinicalTrials.gov Study Title: Condom Performance in a Longitudinal Enhanced Assessment of User Experiences (C-PLEASURE)

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Statistical Analysis

Statistical power and sample size

Using a sample size of n=504 randomized participants, assuming 80% retention to n=403, and α=0.05 we estimated > 99% power to detect a statistically significant contrast for Aim 1 across a wide range of possible event-level pleasure scores. For Aim 2 at 80% and 90% power, assuming 80% retention, the minimum underlying values of fitted-condom preference $\hat{\pi}_{2,1}$ that would be detectable as significantly higher than 0.5 ranged from 0.56 to 0.57. Given these calculations, we sought to have at least 404 participants complete the trial. Based on our previous studies in Atlanta, we anticipated 20% loss to follow-up from the 504 enrolled participants.

Data analysis

The planned primary analysis of Aims is described in Table 1.

Table 1. Outcome measures used to assess each study aim

	Aim	Outcome measure
1	To compare fitted condoms with standard condoms regarding levels of reported pleasure as determined by rating per condom use event	Pleasure-scale score (response item mean) for fitted condoms and standard condoms, following each coital event
2	To compare fitted condoms with standard condoms regarding preference as determined by dichotomous preference among the two conditions at the study conclusion	Binary preference of fitted versus standard condoms, at final study visit
3	To assess for fitted, thin, and standard condoms the total clinical failure rate of each type of	Binary occurrence of clinical failure for each type of condom, at each coital event

	condom for anal sex among MSM relative to a cut-point to be determined by the FDA	
4	To compare fitted condoms with standard condoms regarding total clinical failure for anal sex	Binary occurrence of clinical failure for fitted and standard condoms, at each coital event

Aim 1 involves the pair-wise comparison of pleasure scores between fitted and standard condoms. A linear mixed effects model with random effects for person and including arm, condom type, cross-over period, and an arm*condom type interaction term will be conducted to account for repeated measures within participants (i.e. the crossover design) and for repeated measures on coital acts within each of the three conditions. Model-based estimates and confidence intervals of the difference in pleasure score will be used to compare fitted and standard condoms. Additional control for participant-, partner-, and event-level correlates of pleasure in the above model will be considered in secondary analyses. The primary analysis of Aim 2 will be conducted at the participant-level, using binary preference responses for comparison of fitted and standard condoms, collected at the final study visit (Table 1). For Aim 2, we will assess whether a majority of participants preferred fitted over standard condoms using a logistic regression model with preference as the outcome with arm and cross-over period as covariates. A confidence interval around the estimated probability of fitted condom preference will be computed.

A descriptive assessment for Aim 3 will consist of calculating the per-anal sex act clinical failure proportion for the 3 condom conditions by dividing the number of total clinical failures by the total number of acts contributed for each condom type by participants in the MSM arm of the

study. We will assess whether the proportion of failure for each condom type is below the threshold value that is to be determined by FDA. In order to adjust for study design, failure will also be assessed with a logistic mixed effects model with random effects for person with arm, condom type, cross-over period, and an arm*condom type interaction term.

For Aim 4, we will use the logistic mixed model described in Aim 3 to assess the odds of failure for fitted versus standard condoms within the MSM arm. Instances of anal sex among MSW will not be included in primary analyses because anal sex events occur frequently at the lifetime level for MSW, but infrequently at monthly- and even yearly- levels,[1] This indicates lower levels of experience with this type of sex for many MSW, an issue that could introduce bias into study outcome assessment.

Measures

Coital log measures

The daily coital log explored event-level questions that addressed the context of condom use and study outcomes; questions were based on items from ISO,[2] a cohort study of MSM,[3] and a validated pleasure scale[4]. Relevant to Aims 3 and 4, ISO guidance defines clinical failure as combined clinical breakage and slippage [2], and we will follow ISO guidance for calculating total clinical failure. For instance, any condom failure in which breakage and slippage occur for the same condom will be counted as a single failure for calculation of total clinical failure.

Based on a literature search and consultation with experts, we identified no extant event-level scale to assess pleasure. We therefore developed and validated the Event-level Male Sexual Pleasure Scale (EMSexPleasure), previously described elsewhere.[4] The coital log was used to assess study outcomes of Aim 1 pleasure (EMSexPleasure) and Aims 3/4 clinical failure for slippage/breakage (ISO). The log also assessed relevant context for the sexual act, with source of

item provided in parentheses: (a) Date and time of report (ISO), (b) whether a study condom, other condom, or no condom was used (ISO), (c) Partner name (cohort study), (d) Lubricant use (ISO), (e) Type of sex act (ISO), (f) failure outcome with condoms (ISO), and (g) Drug or alcohol use by participant (cohort study).

Endline measures

Preference, the outcome measure for Aim 2, was measured at the final study visit. For each of three possible combinations of two crossover conditions (standard/thin, thin/fitted, standard/fitted), there was a paired comparison asking participants to select their preferred condom between the two relevant study conditions. To maintain blinding, preference question response options were the color assigned to each of these condom types (e.g. blue or yellow).

References

1. Herbenick D, Reece M, Schick V, Sanders SA, Dodge B, Fortenberry JD. Sexual behavior in the United States: results from a national probability sample of men and women ages 14-94. The journal of sexual medicine. 2010 Oct;7 Suppl 5:255-65. PMID: 21029383. doi: 10.1111/j.1743-6109.2010.02012.x.
2. International Organization for Standardization. Condoms — Guidance on clinical studies — Part 1: Male condoms, clinical function studies based on self-reports. 2012.
3. Sullivan PS, Rosenberg ES, Sanchez TH, Kelley CF, Luisi N, Cooper HL, et al. Explaining racial disparities in HIV incidence in black and white men who have sex with men in Atlanta, GA: a prospective observational cohort study. Annals of epidemiology. 2015 Jun;25(6):445-54. PMID: 25911980. doi: 10.1016/j.annepidem.2015.03.006.
4. Siegler AJ, Boos E, Rosenberg ES, Cecil MP, Sullivan PS. Validation of an Event-Level, Male Sexual Pleasure Scale (EMSEXpleasure) Among Condom-Using Men in the U.S. Archives of sexual behavior. 2018 Aug;47(6):1745-54. PMID: 29392486. doi: 10.1007/s10508-017-1103-5.