Abstract of thesis entitled

The use of computer-assisted self-interviewing (CASI) to increase disclosure of sensitive behaviors among clients attending sexually transmitted infection clinic

Submitted by

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Sexually transmitted infection (STI) including Human Immunodeficiency Virus (HIV) is a worldwide public health issue. In local public STI clinics in Hong Kong, clients' information on sexual behaviors is currently obtained by face-to-face interview. Misreporting of sensitive behaviors may occur when clients under-report their risk behaviors due to concerns of privacy or fear of judgment by the interviewer, or over-report behaviors which they think are favorable. Computer-assisted self-interviewing (CASI) has been suggested as an effective method to encourage honest reporting of sensitive behaviors by allowing clients
to complete the questionnaire on electronic devices without the presence of an interviewer.

Given that there was no systematic review on the use of CASI in local STI clinics, this dissertation aims to evaluate the current evidence on the effectiveness of CASI in reporting sensitive behaviors among clients attending STI clinics, to develop an evidence-based CASI guideline for clients attending public STI clinics, to assess its implementation potential in public STI clinics, and to develop pilot and evaluation plans.

A systematic search of PubMed, CINAHL PLUS and PsycINFO identified 6 randomized controlled trials that assessed the efficacy of CASI in reporting of sensitive behaviors. Using the Scottish Intercollegiate Guidelines Network (SIGN) checklist, two of these studies were graded as high quality, three studies were graded as acceptable, and one study was graded as low quality. Results from the 6 selected studies showed CASI significantly increases disclosure of sensitive behaviors and lower non-response rate to interview items. Accordingly, there is strong evidence in support of the use of CASI to increase disclosure of sensitive behaviors.

An evidence-based guideline of CASI was developed for local public STI clinics. The characteristics of clients in the local setting are similar to those of the retrieved studies. Implementation of CASI in local setting is expected to be feasible as the organization is likely to be supportive of this innovation and provide the necessary recourses. Cost-benefit
analysis showed that CASI can generate a potential saving of around $87,360 for each STI clinic annually.

An effective communication plan targeting stakeholders is developed to facilitate implementation of CASI. Following that, a one-month pilot study will be conducted in one of the STI clinics and adjustment will be made to the guideline if necessary. Program evaluation which lasts for two months will be conducted after the entire program implementation. The rate of reporting sensitive behavior is considered as primary patient outcome, while STI diagnosis and patient's satisfaction level are considered as secondary outcome. Healthcare provider outcome refers to staff satisfaction level and staff morale. System outcome refers to the reduction of human resources and cost of the innovation. Innovation effectiveness will be determined by increase in reporting of sensitive behaviors, STI diagnosis, client and staff satisfaction level, a reduction in manpower for conducting interview, and cost of the innovation.
The use of computer-assisted self-interviewing (CASI) to increase disclosure of sensitive behaviors among clients attending sexually transmitted infection clinic

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Declaration

I declare that this dissertation represents my own work, except where due acknowledgment is made and that it has not been previously included in a thesis, dissertation or report submitted to this University or to any other institution for a degree, diploma or other qualifications.

________________
Yeung See Pang
August 2015
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Chapter 1

Introduction

1.1 Background

Sexually transmitted infection (STI) is one of the major global causes of acute illness and chronic disability which may cause severe physical and psychological consequences (WHO, 2008). STI in women may lead to pelvic inflammatory diseases, abnormal pregnancy outcomes or infertility. Mother-to-child transmission of STI may cause congenital deformities, severe medical consequences or even infant mortality. According to World Health Organization (2008), there was an increasing global trend in incidence of STI and Human Immunodeficiency Virus (HIV) infection. It was estimated that in 2008, around five hundred million people of global population were infected with the four major curable STI (Syphilis, Neisseria Gonorrhoeae, Chlamydia Trachomatis and Trichomonas Vaginolis), which was 11% higher than that in 2005. The threat of growing drug resistance of STI pathogens especially Neisseria Gonorrhoeae to common antibiotic regimen has raised further concerns.

HIV caused 1.5 million deaths globally in 2013 and it is estimated that 39 million people are living with this non-curable STI worldwide (WHO, 2014). In Hong Kong, whilst the number of reported HIV incidence has been relatively lows since the first reported case in
1984, in recent years, there has been a period of rapid growth (Le & Ho, 2008). There were 559 reported cases in 2013, being 9% higher than that in 2012 and the record in the first two quarters of 2014 was even higher compared to first two quarters of 2013. Majority of the infected cases were resulted from homosexual contact or bisexual contact which accounted for 53% of new cases in 2013 and it was expected that this would be a continuous growing trend (DH, 2014). There is a need for surveillance of sexual behavior and risk factors in order to interpret the epidemiological trend of HIV, hence to implement effective preventive measures on HIV and other STI.

STI clinic under a government unit is the center for management, prevention and control of STI in Hong Kong. One of its important roles is to assess and understand STI trends in order to develop behavioral interventions for clients especially those high risk groups. The validity of assessment depends on clients’ accurate reporting of sensitive behaviors (DH, 2014). However, challenges are often encountered during data collection, as clients are required to report a range of sensitive, stigmatized or even illegal behaviors. There may be occurrence of social desirability bias when clients under-report their risk behaviors or over-report their behaviors which they think are socially acceptable. Misreporting of sensitive behaviors not only affects the accuracy of STI diagnosis, but also reduces understanding of STI epidemiology, which in turn influences development of STI intervention programs as
well as prevention strategies (Gregson et al., 2002). Literature suggested that self-interview encourages honest reporting of sensitive behaviors due to a better perception of privacy (Tourangeau et al. 1997). There is also growing evidence showing that computer-assisted self-interviewing (CASI) can help minimize social desirability bias, and thus may work better than standard face-to-face interview in current practice (Turner et al., 1998; Tideman et al., 2006).

CASI is a data collection method using computer applications. It allows clients to complete the questionnaire on laptop, tablet computer or other hand-held electronic devices without the presence of an interviewer. Clients read the questions on computer screen and answer by clicking a mouse, pressing the number keypad or tapping onto the touch-screen. Data collected would be sent to a database immediately after interview (Tideman et al., 2006; Taylor et al., 1999).

Audio computer-assisted self-interviewing (ACASI) is an audio-enhanced computer application which integrates audio and visual displays so that clients can listen to computer headphones when reading the corresponding question displayed on computer screen. The advantage of ACASI is that it improves data validity as it does not solely rely on clients' reading skills and facilitates responses in clients with low literacy or no experience of using computer (Taylor et al., 1999).
1.2 Affirming the need

STI clinic under a government unit is responsible for effective control of STI and HIV in Hong Kong. It provides the most comprehensive source of information over the epidemiology of STI in Hong Kong. Accurate data is essential for identifying risk factors attributing to the trends and to evaluate STI prevention strategies. However, as a result of the potential bias, the data collected by local public STI clinic contributes to only part of Hong Kong STI epidemiological profile (Lo et al., 2008).

Under current practice, routine STI screening, health education and counseling are offered to clients attending the STI clinic. STI diagnosis is established by sexual history, physical examination and investigations. Nurses in Anti-Venereal Disease Offices of every STI clinic play an important role in control and prevention of STI as they are responsible for pre-consultation interview, counseling, health promotion, tracing defaulted cases and referring partners to STI clinic. The pre-consultation interview collects information in relation to sexual history including venereal exposure, sexual orientation, protective measures during intercourse, menstrual history and history of STIs. Clients are also invited to complete a questionnaire for behavioral surveillance, by which their demographic data, symptoms and diagnosis, history on sexual behaviors, and consent for HIV screening will be asked (Lo et al., 2008).
Data collection in STI clinic remains on voluntary basis and their effectiveness depends on clients' willingness to disclose risk factors. Recording sexual history is important in making accurate STI diagnosis and collection of epidemiology data. It should be collected in a careful and non-judgmental way to avoid embarrassment (Lo et al., 2008). However, data collection by the nurses may be affected by certain factors. For example, nurses may have different interpretations of the question intended to be asked or they may ask the questions in a way which is misunderstood or difficult to be understood by the clients. Moreover, language barrier may cause communication issue when interviewing ethnic minorities, which makes gathering of accurate sexual history difficult.

Social desirability bias is another concern when it comes to gathering of sexual history as it is a private issue which may involve social stigmatized behaviors. Reporting of stigmatized behavior is affected by social norms and values and under-reporting of social undesirable risk behaviors may occur (Taylor et al., 1999; Mensch et al., 2003). Under-reporting also occurs when clients want to please the healthcare staff after certain intervention (Des Jarlis et al., 1999). In addition, sensitive questions might cause more significant recall bias. Those clients who are aware of high risk behaviors may be less willing to report than those are not aware of the same (Le & Ho, 2008).
As STI can be asymptomatic, particularly among women, under-reporting of risk sexual behavior may cause under-estimation of STI risk and reduction in uptake of STI investigations. This affects the accuracy of diagnosis leading to consequences of health outcomes.

Inaccurate data would also adversely affect investigation of disease epidemiology and evaluation of intervention strategies. According to Le & Ho (2008), data in Hong Kong is fragmented over STI high-risk groups, such as commercial sex workers, men who have sex with men and marginal youth. Therefore, it is essential to develop an advanced data collection system for further surveillance or preventive initiatives.

CASI and ACASI were developed for interview-based research and pre-consultation interview in western countries. They are standardized data collection systems so clients are responding to the same set of questions. Variations caused by individual interviewers can hence be eliminated (Turner et al., 1998). Besides, multilingual questionnaires could be generated and enhanced internal consistency was reported (Tourangeau et al., 1997). The self-administration interview mode also increases the level of privacy, and encourages honest reporting of social stigmatized behaviors. There is increasing evidence that clients, especially adolescents, prefer to report sensitive issues in a less threatening approach (Tourangeau, 2004; Tideman et al., 2006).
Moreover, CASI can be integrated to the development of electronic health records (EHR) in public STI clinics. Apart from saving clinic time and manpower in patient data entry, CASI together with EHR assist with the formation of a database for future development and implementation of preventive strategies (Richens et al., 2010).

1.3 Objectives & Significance

CASI potentially encourages disclosure of sensitive behaviors by clients attending STI clinics. The improved reliability of information obtained will have a positive impact on diagnosis of STI, partner referrals, risk-reduction counseling by health advisors and gathering of data for epidemiological investigation. Given that there has not been sufficient evidence-based guideline of CASI for STI clinics in local setting, the objectives of the proposed dissertation are:

1. To evaluate evidence of the effectiveness of CASI in reporting sensitive behaviors;

2. To develop an evidence-based CASI system for clients attending public STI clinics;

3. To assess the implementation potential of CASI system in public STI clinic; and

4. To develop plans for pilot and evaluation of CASI system.

According to the retrieved literature, it is expected that CASI would significantly increase disclosure of sensitive behaviors among clients attending STI clinics which in turn
increase the rate of diagnosis of STI. Also, the electronic record system enhances clients’ privacy and reduces the time for pre-consultation interview. Therefore, it is expected that CASI system will improve quality of care and enhance clients' satisfaction level.
Chapter 2

Critical Appraisal

2. 1 Search & Appraisal Strategies

2.1.1 Identification of studies

PICO framework was used to generate the clinical question. Population (P) was identified as clients attending STI clinic; intervention (I) was identified as CASI or ACASI; comparison (C) was identified as face-to-face interview or interviewer-assisted interview; outcome (O) was identified as reporting of sensitive behaviors.

2.1.2 Selection criteria

Inclusion and exclusion criteria were set up for identifying relevant studies. Studies that meet all of the following criteria were included:

1. Subjects aged 13 or above;

2. Intervention was either CASI or ACASI;

3. Comparison group was traditional face-to-face interview or interviewer-assisted interview;
4. Outcome measure included reporting of sensitive behaviors (e.g. vaginal, anal or oral sex, use of contraceptive measures or condom, number of sexual partner, risky sexual behaviors);

5. Study design was randomized controlled trial (RCT); and

6. Published in English or Chinese.

Studies that meet any of the following criteria were excluded:

1. Subjects that were non-human animals; or

2. Subjects that were intravenous drug users.

2.1.3 Search strategies

From 11 August 2014 to 28 August 2014, a systematic literature search was performed on three electronic databases: PubMed, CINAHL PLUS and PsycINFO. The searching keywords were "computer-assisted self-interview", "audio computer-assisted self-interview", "self report", "interview mode" for intervention; "sensitive behavior", "risk behavior", 'sexual behavior" for outcome and " sexual health", "sexually transmitted infection", "STI", "HIV" for the target group. Studies were restricted to human subjects, randomized controlled trials published in English or Chinese. Searching references were performed on two electronic
databases: PubMed and CINHAL PLUS using the same keywords. They were restricted to studies on human.

2.1.4 Data extraction

Information related to the study design, year of publication, country of study, subject characteristics, intervention, comparison, length of follow up, outcome measure and effect size were extracted from selected studies, analyzed and summarized.

2.1.5 Critical appraisal

Methodology checklist of Scottish Intercollegiate Guidelines Network (SIGN) (2012) was used as the tool to assess the methodological quality of selected randomized controlled trials. Critical appraisal of selected studies was conducted based on the 11 guiding questions. Levels of evidence were graded according to SIGN (2012) grading system.

2.2 Results

2.2.1 Search results

The search strategy and PRISMA flowchart are presented in Appendix I. A total of 375 citations were retrieved after keyword search conducted from 11 August 2014 to 28 August 2014. Of the retrieved citations, 282 were from PubMed, 37 were from CINAHL PLUS and 56 were from PsycINFO. After screening the title and abstracts, 38 articles were identified as
potentially relevant articles. Full texts of the studies were carefully screened by applying the inclusion and exclusion criteria. Studies were excluded if (1) they were quasi-experimental designs; (2) they only targeted intravenous drug users; (3) they did not involve traditional personal interview mode as comparison; (4) they did not involve sensitive behavior as outcome measurement. Eleven studies were retrieved after reviewing the full text. Three additional studies fulfilling the criteria were included after screening the reference lists of related studies. After elimination of duplicated studies, a total of six relevant studies were extracted for further review and quality assessment.

2.2.2 Study characteristics

The study characteristics are summarized in Appendix II. Studies included in this dissertation were published from 2004 to 2012. Two of six studies were conducted in Vietnam, others were conducted in United Kingdom, Brazil, Kenya and Zimbabwe. No local study was found to be relevant for the purpose of this dissertation. The studies were conducted in household setting, outpatient setting or both settings, with sample size ranging from 700 to 4620. Two studies targeted females only and the remaining four studies targeted both genders. All retrieved studies were RCTs comparing the rate of reporting sensitive behaviors between CASI and other interview modes including traditional face-to-face interview or interviewer-assisted interview. All of the six studies showed statistically
significant increase in reporting of sensitive behaviors which was consistent with previous studies (Tideman et al., 2006; Macalino et al., 2002).

2.2.3 Methodological quality appraisal

All retrieved studies set out the research focus, hypothesis and predicted outcomes in the introduction part. The study population, interventions, recruitment and outcome measures were stated clearly in the methodology.

Randomization

All of the retrieved studies except Hewett et al. (2004) described the randomization method explicitly. Hewett et al. (2004) mentioned random assignment without sufficient description on randomization method. For subject allocation, Le and Vu (2012) used a computer program to generate random allocations. Le et al. (2005) used systematic-random sampling method by obtaining youth roster in each sub-communes. Random permuted block design was used in the remaining three studies (Richens et al., 2010; Langhaug et al., 2011, Hewett et al., 2008).

Concealment

Three of the retrieved studies referred to concealment method. Le and Vu (2012) used computerized random assignment; Langhaug et al. (2011) used opaque envelopes carrying
assigned codes and Richens et al. (2010) used sealed numbered envelopes. The remaining studies did not provide sufficient information about the concealment method.

**Blinding**

As the study intervention was interview mode, it was impossible to blind neither the subjects nor the researchers. Accordingly, all of the selected studies were not applicable to blinding.

**Baseline characteristics**

In comparing baseline characteristics between study groups, two studies did not adequately described the demographic data (Richens et al., 2010; Hewett et al., 2004). The rest of the studies presented demographic characteristics of study groups clearly using table format. There were no significant difference in relation to age, marital status and ethnic origin (Le & Vu, 2012; Langhaug et al., 2011; Hewett et al., 2008; Le et al., 2005). However, small differences in baseline characteristics reaching the level of statistical significance were noted in some studies. Slightly higher educational level and economic status were found in the intervention group (Le et al., 2005). Le and Vu (2012) also reported slightly higher proportion of women in the intervention group. Nevertheless, the differences were reasonably negligible and did not have a material impact on the study outcome.
**Outcome measurement**

All retrieved studies clearly stated the outcome measurement. Reporting of sexual behaviors was measured in all studies. In addition, STI diagnostic test pattern and STI diagnosis were measured to examine the impact of interview mode on STI diagnosis (Richens et al., 2010). Estimated association between self-reported risk behavior and presence of STIs was also reported in order to validate interview mode by biomarkers, i.e. positive results of STIs (Hewett et al., 2008).

**Dropout rate**

The dropout rates of the retrieved studies ranged from 0% to 48.9%. Two studies reported no dropout rate (Hewett et al., 2008; Hewett et al., 2004). The dropout rates were low in studies requiring no follow up, i.e. from 0% to 14.9% (Le & Vu, 2012; Richens et al., 2010; Hewett et al., 2008; Le et al., 2005; Hewett et al., 2004). The highest dropout rate was 38%, in a study requiring one week follow up (Langhaug et al., 2011). No significant difference between dropout groups and participants were reported among the studies. Intention to treat analysis was applied in two studies, and the non-response rates were calculated as not answering to items (Langhaug et al., 2011; Richens et al., 2010).

**Level of evidence**
According to the criteria suggested by SIGN (2012), two studies were ranked as the highest level of evidence (++) as they fulfilled most criteria of a RCT (Le & Vu, 2012; Langhaug et al., 2011). Three studies were ranked as acceptable (+) since there was a risk of bias due to inadequate description in concealment method or demographic characteristics between study groups (Richens et al., 2010; Hewett et al., 2008; Le et al., 2005). One study did not express clearly the randomization method was ranked as unacceptable (0) (Hewett et al., 2004).

Sample size calculation

Sample size calculation was reported in all of the selected studies. 80% statistical power was reached in four studies (Richens et al., 2010; Hewett et al., 2008; Le et al., 2005; Hewett et al., 2004), 85% statistical power was reached in Langhaug et al. (2011) and 95% statistical power was reached in Le and Vu (2012). Data collection method and measuring tools were similar among study groups of the retrieved studies.

Data collection method

For STI investigation, nucleic acid amplification test which is the golden standard was used to test Chlamydia Trachomatis and N. Gonorrhoeae. For reporting of sexual behaviors, logistic regression and bivariate probit model were commonly used to interpret the findings.
Results in all retrieved studies were presented in tables with statistical analysis (Le & Vu, 2012; Langhaug et al., 2011; Richens et al., 2010; Hewett et al., 2008; Le et al., 2005; Hewett et al., 2004).

Although most of the selected studies were conducted in developing countries, the target populations of the studies were sexually active adolescent or adults, which are similar to that of this dissertation. Two studies were conducted in STI outpatient clinic, which is the same as the proposed setting (Richens et al., 2010; Hewett et al., 2008). To conclude, the results of the studies are applicable to the local outpatient setting. Details of the critical appraisal are listed in Appendix III.

2.3 Summary & Synthesis

2.3.1 Summary of data

*Interventions*

All of the retrieved studies compared interview results of CASI with various types of traditional interviews methods. Richens et al. (2010) used CASI as intervention. The remaining five studies involved audio headphone in addition to the computer interview program, i.e. ACASI (Le & Vu, 2012; Langhaug et al., 2011; Hewett et al., 2008; Le et al., 2005; Hewett et al., 2004).
In general, interventions of the six retrieved studies were conducted in a similar way. Among studies using ACASI as intervention, participants were commonly invited to answer questions by pressing number keys (Le & Vu, 2012; Le et al., 2005; Hewett et al., 2004). Langhaug et al. (2011) used a mouse to click onto the selected answer. Richens et al. (2010) conducted CASI by tablet computer which participants answered questions by touching onto the screen. Hewett et al. (2008) did not sufficiently describe the computer device used. All the interventions were performed privately in the absence of interviewer.

Comparisons

All studies included interviewer-assisted interview or face-to-face interview as comparison group. Comparisons of intervention with various traditional interview modes were conducted in most studies except Hewett et al. (2008), which solely compared ACASI with face-to-face interview. In addition to face-to-face interview, other interview mode such as self-administered paper-and-pencil questionnaire was compared in two studies (Le & Vu, 2012; Langhaug et al., 2011), CAPI was used by Richens et al. (2010) and audio-self-assisted questionnaire was used by Langhaug et al. (2011) as comparison group.

Crossover randomization design was used by Langhaug et al. (2011), block randomization of four questionnaires delivery modes was conducted in round one and 43% of participants were randomized to complete a short questionnaire in round two (a week later).
Hewett et al. (2004) also compared all study groups with an exit interviewer administered interview. STI statuses were measured in two clinic setting studies (Richens et al., 2010; Hewett et al., 2008). Biomarkers of STIs, i.e. Neisseria Gonorrhoeae, Chlamydia Trachomatis and Trichomonas were investigated. Associations between STIs status and reported sexual behavior using different interview modes were presented (Hewett et al., 2008). Richens et al. (2010) measured biomarkers of STIs and blood tests and associations between STIs, high-risk behavior, uptake of diagnostic tests and referral to counseling with various interview modes were examined.

**Outcome measures & effect size**

Reporting of sensitive behaviors was commonly used as outcome measurement among all studies. Comparisons of non-response rate among interview modes were also presented in two studies (Le & Vu, 2012; Langhaug et al., 2011). Significant increase in disclosure of sensitive behavior and reduction in non-response rate of sensitive question were reported in ACASI and CASI(Le & Vu, 2012; Langhaug et al., 2011; Richens et al., 2010; Hewett et al., 2008; Le et al., 2005; Hewett et al., 2004). Le & Vu, (2012) reported significant increase in affirmative answer to "ever had sex with a sex worker" in male participants using ACASI compared to personal interview group (4.3% versus 2.3%; p<0.05). Le et al. (2005) also reported ACASI group had higher prevalence than personal interview group in reporting
"ever had sex with a sex worker" in male participants aged 20 to 24 years (OR=2.05; p<0.05, 95%CI) and in general male participants (OR=2.33; p<0.05, 95%CI). Also, there was a surge in reporting of "unprotected vaginal sex in last month" (ACASI 59% versus face-to-face interview group 51%; p<0.05) and "mean number of sex acts without using condom" (ACASI 7 versus face-to-face interview group 5.8; p<0.05) (Hewett et al., 2008). Reduction in non-response rate of "use of condom during last sexual intercourse" was reported by Langhaug et al. (2011) (ACASI 0% versus audio self-assisted questionnaire 9.3%, self-administered questionnaires 23.7%; p<0.001, 95%CI).

An increase in reporting of sexual behaviors among young people was also notably recorded (Langhaug et al., 2011; Le et al., 2005; Hewett et al., 2004). The non-response rate of young people in answering "mean number of sex partner", "age at first intercourse" and "condom use at last intercourse" were minimal ranging from 0% to 2.4% (Langhaug et al., 2011). When compared to interviewer assisted personal face-to-face interview, ACASI resulted in a higher reporting rate of "ever had sexual intercourse" in respect of participants aged fifteen to nineteen (OR=2.79; p<0.05, 95%CI) (Le et al., 2005). Hewett et al. (2004) found ACASI significantly increased young people in reporting of coerced sex and sexual history with friend, schoolmate, acquaintance, relative, stranger, man who was ten or more years older. It is therefore noted that ACASI yielded more highly sensitive responses and
diverse picture of sexual activities among adolescents than interviewer administered interviews.

In addition, response agreement between modes was examined (Langhaug et al., 2011; Hewett et al., 2004). Langhaug et al. (2011) found that ACASI increased validity in reporting of risk behaviors. Participants reported "never had sexual intercourse" in round 1 were more likely to change to positive response when using ACASI in round 2 (ACASI 16.1% versus self-administered questionnaires 1.2%, Informal confidential voting interview 1.2%, audio self-assisted questionnaire 6.6%; p=0.04) and no negative conversion was noted in round 2 with ACASI. On the other hand, Hewett et al. (2004) assessed the consistency of interview modes by comparing responses in the main interview (ACASI) with an exit interview (face-to-face interview). 12% increase in response was noted when ACASI group was compared with interviewer administered exit interview (Hewett et al., 2004). However, no statistical analysis was given in the comparison and there were limitations that only one question was asked in the exit interview while numerous questions were asked in the main interview and there was possibility that participant were aware of interviewer may know their previous answers.

Estimated association between self-reported risk behavior and STI status was reported by Hewett et al. (2008) and Richens et al. (2010). Hewett et al. (2008) found ACASI
increased reporting of risk behaviors in STI-positive women. It was also reported that computer-assisted interview method was associated with higher uptake of STI tests; however, no significant difference in STI diagnosis was found (Richens et al., 2010).

2.3.2 Synthesis & Recommendations

The results reaffirmed that interview delivery modes do affect self-disclosure of sensitive behaviors. There was strong evidence showing that CASI and ACASI increase disclosure of sensitive behavior and lower non-response rates to items (Le & Vu, 2012; Langhaug et al., 2011; Richens et al., 2010; Hewett et al., 2008; Le et al., 2005; Hewett et al., 2004). On the assumption that clients would not over-report risk behavior due to social stigmatization, a higher reporting of risk behavior indicates a more accurate reporting (Brener et al., 2003).

Validation of self-reports against biomarkers also suggested more accurate reporting using ACASI than face-to-face interview. Hewett et al. (2008) used biomarkers to validate self-reported behaviors by different interview modes. Significant relationship between STI status and risk behavior was found, particularly in ACASI group. Results also showed that STI-positive women were more likely to under-report their risk behavior in face-to-face interview mode which was consistent with previous findings (Macalino et al., 2002).
Under-reporting of risk behavior may affect accurate diagnosis, treatment, health counseling as well as partner referral.

The results of the five selected studies which conducted in developing countries with limited resources and population with low level of computer-literacy showed that ACASI was feasible and acceptable (Le & Vu, 2012; Langhaug et al., 2011; Hewett et al., 2008; Le et al., 2005; Hewett et al., 2004). It was found that audio-headphone together with CASI can improve the quality of sensitive data collection in population with little or no experience of computer use. As majority of Hong Kong people are familiar with computer or hand-held electronic devices, it is believed that CASI is acceptable to most of the clients attending STI clinic. In addition, ACASI may further increase acceptability in low education level or low computer literacy clients.

CASI also improved quality of data entry. Evidence showed that data entry errors were reduced when it was performed by computer program as data entered by clients would be directly send to an electronic database. Besides, CASI with standardized questionnaire produced fewer missing questions and improved internal consistency. Efficiency and accuracy in data collection were enhanced (Le & Vu, 2012; Jaspan et al., 2007). Together with the development of EHR, electronic appliance is now available in local STI clinic and it is feasible to develop a computer program. Moreover, manpower in interviewing clients
would be reduced, more nursing staff can take part in health education as well as post-consultation health counseling.

The format of the electronic questionnaire is important as the wording of questions may also affect clients' willingness to disclose sensitive information and engage in diagnostic tests. It is suggested that CASI should be designed in a way that encourages patient to commit STI diagnostic test such as HIV screening as it is one of the aims of STI clinic. Also, the refusal items should be shown to clinicians during consultation so to encourage clients' participation (Richens et al., 2010).

The intervention emphasized on increasing level of privacy when completing the questionnaire. Interventions in all selected studies were conducted in a private room or private area of the clinic without presence of an interviewer. It is important to ensure clients’ privacy and confidentiality during interview in order to encourage honest disclosure of sensitive behaviors.

Evidence from the selected studies showed that CASI improved response rates to sensitive behaviors and provided more accurate and reliable results. The extracted evidence reaffirmed that CASI reduced social desirability bias, thus encouraged reporting of sensitive behaviors and reduced under-reporting of risk behaviors. The disclosed information was clinically useful and important for the diagnosis. To conclude, CASI is recommended and the
main reason is that it works better than other interview modes (particularly traditional face-to-face interview) in terms of collection of sensitive data.
Chapter 3

Translation and Application

3.1 Implementation potential

In Chapter 2, we identified sufficient evidence to support the application of CASI system in increasing disclosure of sensitive or risk behaviors among clients attending STI clinic. In order to integrate the scientific evidence into local practice, an evidence-based guideline in response to local setting is generated from the retrieved studies and potential of implementation should be assessed to ensure successful implementation. According to Pilot and Beck (2004), there are three main aspects for assessing the implementation potential of an innovation: transferability of the findings, feasibility and cost-benefit ratio of the innovation.

3.1.1 Transferability

The retrieved studies showed strong evidence that CASI improves honest disclosure of sensitive information among study populations. Whether CASI is transferable to local clinical setting depends on similarity of the study population with our proposed setting and target population. We will also look into the underlying philosophy of care, estimated number of clients, benefit and time for the innovation to implement and evaluate (Pilot & Beck, 2004).
Target setting

The target setting is local STI clinics under a government unit which is the center for prevention, screening and treatment of sexually transmitted infection for general public. Two of the retrieved studies had similar clinical settings. They were carried out in sexual health clinic where STI treatment and prevention work took place (Richens et al., 2010) and primary care health center where family planning and screening service were provided (Hewett et al., 2008). The remaining studies were carried out in households of different geographic regions (Le & Vu, 2012; Langhaug et al., 2011; Le et al., 2005; Hewett et al., 2004).

Target population

The target population comprises clients in local setting. According to Lo et al. (2008), for male clients, the median age was 38 years old, 25 and 75 percentile was 28 and 50 years old respectively. For female clients, the median age was 33.5 years old, 25 and 75 percentile were 27 and 45 years old respectively. The study populations of four retrieved studies were similar to that of the target population. Richens et al. (2010) covered clients of various age, including those below 25 years old and over 35 years old. Mean age of the study population in Le et al. (2012) was 30.1 years old while that of Hewett et al. (2008) was 27.6 years old. Although no statistics on mean age of the proposed setting were reported, the age distribution of the proposed setting showed majority of clients had similar age with the study populations.
(Lo et al., 2008). On the other hand, two retrieved studies targeted youths (Langhaug et al., 2011; Le et al., 2005) and one study targeted never married females (Hewett et al., 2004). The results of these studies may not represent the whole target population but they are still relevant since they covered younger age groups and female clients of the proposed setting. The target group to adopt this innovation is nurses in STI clinics under government unit.

*Philosophy of care*

The philosophy of care of using CASI among clients attending STI clinic is to improve clinical management of these clients. More reliable reports of sensitive behaviors generated in CASI can enhance accuracy of diagnosis, treatment and partner referral for clients. They also provide a better understanding on local STI trends for development of preventive strategies. According to the Hong Kong Department of Health (2007), its mission is to safeguard health of people of Hong Kong through promotive, preventive, curative and rehabilitative services and STI clinic is responsible for management, prevention and control of STI in Hong Kong. This innovation meets the mission of Department of health and STI clinic in prevention and management of diseases.

*Number of clients benefit*
In local STI clinic, there is around 150,000 cases attendance each year. About 14% of the attendees had new STI diagnosis and about 15% were new attendees (Hong Kong SAR, 2006) and they are all expected to participate in sexual history interview. As a result, it is estimated that each year about 29%, i.e. 43,500 attendees, could be benefited by the implementation of CASI. More reliable reporting of sensitive behaviors can be obtained from this considerable number of clients.

*Duration of program implementation and evaluation*

CASI takes 3 months to prepare before implementation. An operation team consists of the innovation proposer, a nursing officer as the supervisor and eight trainer nurses will be formed. The innovation proposer, the supervisor of the operation team will take part in two half-day meetings with the software engineer to discuss the system operation and run trials. The pilot study will be performed by the operation team. It will take 3 months in which 1 month will be needed for implementation and 2 months will be needed for evaluation and modification. As such, there will be sufficient time for discussion in relation to the innovation feasibility and for modifying the program. Program implementation will last for 4 months. The reports generated during interview will be collected at the end of each month and we will start analyzing the reports afterwards. Program evaluation will take 2 months and staff survey
is conducted concurrently in the implementation phase and evaluation phase. It is anticipated that the innovation will take 1 year to implement and details are presented in Appendix IV.

As the characteristics of the target population in local setting are similar to that of the retrieved studies, CASI is transferable to the local setting and the recommendations generated in the studies should be applied when setting up the guidelines.

3.1.2 Feasibility

After discussing the transferability of the retrieved evidence, feasibility is another concern when introducing innovation to local setting. Challenges due to resistance from nursing staff, organizational levels and shortage of resources are often reported when implementing evidence-based practice. Supports from the organization, administrators and frontline nursing staff are essential for active participation to the innovation (Davies et al., 2008). Pilot and Beck (2004) identified several points to be discussed when assessing the feasibility an innovation.

Human-related

Successful implementation of nursing-oriented guideline requires supports from the organization and other discipline. Nurses in different services of the government unit are familiar with development of nursing-oriented guidelines for their target population. In STI
clinic, nursing staff developed health interview and evening visit guidelines targeting STI clients. They are capable to carry out changes and to monitor the implementation progress independently.

Active participation and supports from nursing staff as well as physicians are important for effective implementation of innovation. When implementing guidelines, extra workload may be caused by program development and training. In CASI, two program coordinators would participate in two half-day meetings when developing the program. A trainer nurse from each clinic, i.e. total eight trainer nurses will deliver an one-hour briefing session to all nursing staff in their own clinic. It is expected that workload would be increased at the beginning and clinic time would be used to familiarize with the system. However, as the program would increase efficiency of pre-consultation interview and data entry, in the long run, clinic time would be saved and workload of nursing staff and medical officers would be reduced. It is believed that nursing staff and medical officers would support the innovation.

Attitude of nursing staff towards evidence-based practice is also crucial. In our service, medical officers conduct meetings bi-weekly to present cases and discuss latest research findings. Although the meetings are held by medical officers, nurses are encouraged to join and it creates an atmosphere favoring evidence-based practice. Hence, it is believed that the resistance to the innovation is low.
Organization-related

Integration of evidence-based guidelines into clinical practice can improve quality of care and health outcomes. In this respect, support by the administrators and stakeholders plays a vital role. In local STI clinic, computerized health records are under development. CASI would provide a good starting point for the full implementation of EHR and it is believed that the administrators would support the CASI utilization.

Moreover, coordination across clinics, supports from the organization and clinic administrators are essential when implementing an innovation. In 2014, the service standardized a new phototherapy treatment protocol which was successfully implemented in all clinics providing the relevant treatment. With supports from medical officers and clinic administrators, frontline staff implemented the guideline efficiently. Also, regular nursing officer meetings provided channels for communications between clinics when implementing the new guideline.

Resources

Local STI clinics are equipped with computer facilities in every consultation room and treatment room. The extra equipment required for CASI are tablet computer or device, protective screen for isolating clients during interview and CASI manual. They are
distributed according to the attendance of each clinic to make sure there would be enough tablet computers or devices for clients to conduct the self-interview at peak registration hours. As extra funding would be required for the development and purchase of new equipment, approval from administrators and related government departments are necessary for program implementation.

3.1.3 Cost/benefit ratio of the innovation

The potential cost for setting up CASI is about $78,493 and the potential operational cost is $3,700 per year. Although the set up cost is relatively high compared to other innovations, the operational cost is reasonable and the innovation can be sustained for long term use. The cost and benefits of the innovation should be considered carefully in order to evaluate the implementation potential.

Potential risk

In the retrieved studies, the template of CASI is user-friendly and is easy to be understood by study population including low-literacy subjects in developing countries. However, it is not applicable to the blind, mental disability as well as illiterate clients. Special assistance, for example audio assistance or traditional interviewer-assisted interview should be offered to this relatively small group of clients.
Additionally, the use of electronic patient records requires strict attention to data privacy and protection, especially in relation to the sensitive information generated in CASI. Safety of network and restriction on staff to access the information are important in order to ensure clients' confidentiality.

Potential benefit

There is ample evidence showing that CASI can reduce the embarrassment of traditional face-to-face interview and thus increase honest disclosure of sensitive information. This would facilitate accurate STI diagnosis and effective STI prevention counseling. In local practice, STI clinics not only provide medical consultation to clients, but also participate in development of prevention initiatives through collecting STI data and understanding the disease epidemiology (Lo et al., 2008). Accurate data on clients' demography, sexual behavior, place of contact are very valuable information for us to investigate STI trends.

CASI also offers the opportunity to save human resources and clinic time in the long run as nurse-led face-to-face interview would be transformed to electronic self-assisted interview. Also, workload on data entry and STI surveillance would be lowered. More nursing staff can participate in post-consultation counseling and increase the opportunity to promote safer sex and deliver health education to clients.
Internal consistency is enhanced through CASI. Computerized interview standardized questions and data collection method so that fewer missed questions reported (Kurth et al., 2004). Together with the service-wide technology development, including EHR, CASI can increase efficiency in data entry and prepare for future access in preventive strategies development.

*Risk of maintaining current practice*

Epidemiology showed that sexually transmitted disease and HIV incidences are in increasing trend globally and locally. Previous studies showed that clients visiting STI clinics especially teenagers had considerably under-reported risky behaviors. This would result in inaccurate diagnosis of STI and have a negative bearing on the gathering of STI epidemiology for disease investigation and modification of prevention strategies.

Data consistency is another concern when using traditional data collection method. There is a risk of data discrepancy when records are collected and processed manually. Also, more clinic time is consumed in handling of interview data.

*Material cost*

The additional materials required for the guideline to implement are tablet computers or devices, protective screens and CASI user manual. It is estimated that total 16 tablet
computers or devices with audio headphones are required for the service to prepare for CASI. The total estimated material cost is around $49,040. In the long run, operation of the CASI requires maintenance of the computer, replacement of protective screens as well as software updates which costs around $3,700 per year. Details are presented in Appendix V.

The implementation of CASI can increase efficiency of interviewing clients and can save clinic time. Under current practice, clients who first attend STI clinic are interviewed by a nurse before medical consultation. Implementation of the new guideline can save nursing staff manpower by around 2 hours per day, which is 520 hours per year in each clinic. As a result, around $87,360 in each clinic could be saved every year.

Potential non-material cost

When initiating the innovation, workload among nursing staff would be increased for short term as they are required to attend additional briefing sessions and workshops. Although the template of CASI is easy to understand and use, a one-hour briefing session is necessary for all nursing staff to understand the flow of the interview and learn how to access the generated information. Also, the program proposer and one nursing officer being the supervisor would participate in developing the program. They are required to take part in 2 half-day meetings with the program designers to explain our service needs and run trials. As an estimate, the expense on manpower preparation and training is around $29,453. To
conclude, it is estimated that the cost for setting up CASI is $78,493 and the running cost is $3,700 per year.

*Potential non-material benefit*

CASI not only saves nursing manpower in face-to-face interview of clinic attendees and in data entry, but also shortens medical consultation time as the attendees already finished the comprehensive sexual history interview by themselves. In the long run, workload of nurses would be reduced and staff morale can potentially be enhanced.

### 3.2 Evidence-based practice guideline

An evidence-based guideline of CASI system has been made for clients attending STI clinics after reviewing the transferability, feasibility and cost to benefit ratio. The instruction and recommendation were generated from selected evidence in Chapter 2 and were graded according to the Scottish Intercollegiate Guidelines Network (2012). Two of the reviewed studies were classified as the highest level of evidence 1++ (Le & Vu, 2012; Langhaug et al., 2011); three were rated as 1+ (Richens et al., 2010; Hewett et al., 2008; Le et al., 2005) and one was rated as 1- (Hewett et al., 2004). The evidence-based guideline for development of CASI for clients attending sexually transmitted infection clinic is attached in Appendix VI.
Chapter 4

Implementation Plan

4.1 Communication plan

4.1.1 Stakeholders

Stakeholders are the keys to successful implementation of innovation. It is essential to identify stakeholders before setting up communication strategies. Stakeholders are categorized into administrators and frontline staff including doctors and nurses involved in the innovation.

Administrators are the management team of the service including consultants, senior nursing officers (SNOs) and nursing officers. Consultants and SNOs have the autonomy to approve new guidelines, allocate human and financial resources. Nursing officers are the in-charge persons in clinics, their role is to supervise nurses, encourage them to adherent to the innovation and provide necessary resources to facilitate implementation. Therefore, support from the administrators is crucial for establishment and implementation of the innovation.

Frontline staffs including doctors and nurses are also stakeholders of the innovation. Doctors are responsible for making diagnosis and prescribe treatment. Their confidence on
the CASI would strongly influence their decision on making diagnosis, hence affecting the outcome of the innovation. Trainer nurses are responsible for provision of training sessions to colleagues, running pilot test, handling technical problems during implementation and conducting evaluation. Nurses in clinics are the major users of the innovation. Their supports in development, utilization and evaluation of the innovation are indispensable to enhance full utilization of CASI.

4.1.2 Communication process

The entire communication process targeting users and stakeholders of the innovation will last for two months prior to staff training and pilot testing. It is divided into three phases, which are the initiating phase, guiding phase and sustaining phase.

In the initiating phase, meetings with administrators will be held. The innovation proposer initiates the communication process by individual meetings with the clinic nursing officers. During the meetings, problems of the current interview system, significance and necessity of the proposed change, evidence from literature and its transferability, feasibility assessment in local setting will be discussed. The innovation will be modified according to recommendations from the nursing officer before approaching higher administrative levels.
The innovation proposer will then introduce the innovation to administrators of the service. A formal presentation to consultants, SNOs and nursing officers will be held during the monthly nursing officer meeting. The presentation will be started by describing the problems of continuing current practice followed by stressing the necessity of introducing the innovation. Evidence retrieved from literature and its transferability, feasibility, the cost to benefit ratio as well as expected accomplishment will be illustrated. The proposer will also provide detailed estimation of resources required for the innovation including nursing staff involved in program development and training, material cost in training, purchasing and maintenance of tablet computers. It is important to point out that although the establishment cost is relatively high compared to other nursing guidelines, CASI produces better patient outcome and saves nursing manpower for interviewing clients. The running cost is also relatively low so it is worthwhile to develop the innovation. A comprehensive proposal will be provided and advice from administrators will be considered for further refinement of the innovation.

After obtaining approval from the administrators, leaflets will be distributed to frontline staff to promote the innovation. Those who are interested in the program will be invited to attend a focused group. We will discuss about the significance and potential problems of the
proposed change and frontline staff are encouraged to express their concerns and opinions in
the focused group.

After seeking support from the administrators and frontline staff, we enter the guiding
phase. An operation team led by the innovation proposer and supervised by a nursing officer
who is responsible for staff development will be formed. Other team members include one
programmer and eight trainer nurses from each of the STI clinics. The operation team is
responsible for development, training, monitoring and evaluation of CASI.

In the first two months, the programmer, the proposer and the supervisor will design
CASI system and prepare training materials. Team meetings will be held bi-weekly to run
trials and provide opportunity for the trainer nurses to familiarize with the program. In the
following month, trainer nurses will conduct trainings to nursing staff in their own clinics.
The proposer and the supervisor of the operation team will attend the monthly nursing officer
meetings in order to maintain active communication with the administrators throughout the
development and implementation process and request for necessary resources.

During the sustaining phase, the trainer nurses will be allocated to their own STI clinic.
They will be the role models to demonstrate proper utilization of CASI and handle technical
programs during implementation. They will also assess frontline staff's attitude towards the
new guideline and conduct satisfaction survey to gather feedback from clients and nurses. In
the first month of implementation, the operation team will hold weekly meetings for team members to have a preliminary evaluation, share experiences in different clinics and make early revision to the new guideline, if needed.

4.2 Pilot testing plan

After program development and staff training, a pilot test which lasts for one month will be conducted by the operation team.

4.2.1 Objectives

Unexpected difficulties are often experience during implementation of new guideline as it is subject to many variables and context specific factors (Walsh et al., 2007). Therefore, a pilot test will be conducted before fully implementation of the new guideline. The goals of the pilot test are to identify unpredictable difficulties and ensure that the questions in CASI were easily interpreted by the clients.

4.2.2 Subject enrollment

One of the STI clinics will be chosen for pilot testing and all eligible clients attending the selected STI clinic will be recruited by convenience sampling. To be eligible for the pilot, characteristics of participants will be identical to that of our guideline. All new attendees are required to fill in the demographic data before pre-consultation interview as usual practice.
The demographic data will be screened by the operation team to select participants in accordance with the inclusion and exclusion criteria of CASI. The operation team will then approach the eligible participants and verbal consent will be obtained. It is estimated that 40 clients will be recruited to the pilot testing.

4.2.3 Staff training

Staff training will be conducted in the month before pilot testing. Training materials and evaluation forms will be prepared by the operation team before delivering training sessions. Eight trainer nurses from different STI clinics will conduct training sessions to nursing staff in their own clinic. Each session will last for one hour and be held once per week. Every nurse is required to attend training session once. In the training session, significance of the innovation with evidence from the literature will be explained. Trainer nurses will demonstrate proper use of the CASI and nurses will be invited to do return demonstration. There will be a discussion session to answer enquiries and feedbacks will be gathered by the satisfaction survey (see Appendix VIII). In addition, a comprehensive user manual will be provided to each clinic.

4.2.4 Data collection
Clients' sensitive information including sexual orientation, STI history and risk exposure will be collected using CASI or traditional face to face interview. The time and manpower required for completing CASI and clients' clinical diagnosis will be documented. Participants are invited to complete a satisfaction survey before leaving the clinic (see Appendix VII). All the information will be collected by the operation team for evaluation and revision of the guideline. Staff satisfaction survey will be conducted weekly in order to gather feedbacks from nurses participating in pilot test (see Appendix IX).

4.2.5 Evaluation of the pilot testing

Data collected will be analyzed and evaluated in the weekly meeting by the operation team. The successful client outcome will be demonstrated by increased in reporting of sensitive sexual behaviors and more accurate diagnosis of STI using CASI compared to tradition face-to-face interview. The efficiency of CASI will be reflected by shortened time and fewer nurses required for interview. The feedbacks from client satisfaction survey and staff satisfaction survey will be considered for further refinement before fully implementation of the program.

4.3 Evaluation plan

4.3.1 Objectives
Following the introduction of an innovation, an evaluation plan focusing on outcome evaluation should be developed. It aims to assess whether the objectives of the innovation can be achieved and the acceptability of the innovation in local setting. It also allows administrators to decide whether the innovation should be adopted in the future.

4.3.2 Outcomes

4.3.2.1 Patient outcomes

According to the retrieved studies, CASI reduces barrier and embarrassment during traditional face-to-face interview and significantly increase clients' disclosure of sensitive sexual behaviors (Le & Vu, 2012; Langhaug et al., 2011; Richens et al., 2010; Hewett et al., 2008; Le et al., 2005; Hewett et al., 2004). Therefore, disclosure of sensitive behavior is considered as the primary outcome. Clients will answer Yes/ No questions about homosexual orientation, STI history and risk exposure using CASI or traditional face-to-face interview. The prevalence of reporting sexual behaviors generated by the two interview modes will be compared.

It is suggested that CASI encourages honest reporting of risk behavior that leads to increase in diagnosis of STIs (Richens et al., 2010). Therefore, STI diagnosis is considered as
a secondary outcome. An increase in diagnosis of STI suggests that more patients are treated and thus it is a desirable outcome.

Moreover, CASI users perceived CASI is a more private and confidential mode for interview (Langhaug et al., 2011). It is believed that clients' satisfaction level would increase and it is also a secondary outcome which can be measured by the client satisfaction survey (see Appendix X).

4.3.2.2 Healthcare provider outcomes

Satisfaction level and compliance among healthcare provider is the key to successful implementation and sustainability of the innovation. It is important to evaluate healthcare providers' satisfaction level throughout the process of training session as well as the implementation process. Nursing staff will be invited to complete a self-report questionnaire after training session (see Appendix VIII). An evaluation survey is used to assess the satisfaction level and confident level at the end of the first month of program implementation (see Appendix IX). They are also encouraged to leave feedback on the comment part. Moreover, CASI increases staff moral as it reduces workload and time spending on interviewing clients. Staff moral can be reflected from the annual sick leave rate.

4.3.2.3 System outcomes
System outcomes refer to the reduction in manpower and expenses for conducting pre-consultation interviews. It can be measured by the average manpower required for CASI compared to traditional face-to-face interview. The set up cost and the running cost of CASI will be reported. They are expected to be compensated by the reduced expense for manpower.

4.3.3 Nature and number of clients to be involved

To evaluate the effectiveness of the new guideline, clients attending the eight STI clinics for the first time will be recruited. The involved clients should meet the criteria with our target population stated in Chapter 2. Convenience sampling will be used for sample recruitment. Verbal consent will be obtained when recruiting clients as the information collected are highly sensitive and confidential. Selected clients will be allocated to perform CASI or traditional face-to-face interview. Data and clinical diagnosis from both groups of clients will be collected by the operation team for program evaluation.

The sample size is calculated by an online program provided by http://www.stat.uiowa.edu/~rlenth/Power/. It is calculated based on a two group, two tailed paired t-test at a power of 80%, an alpha value of 0.05, and standard deviation of 20 to detect clinically significant effect size of 2. As a result, a sample of at least 788 clients is required. Allowing 10% refusal rate, the anticipated sample size for evaluation is 867.
All nursing staff including nursing officers, registered nurses and enrolled nurses participated in the guideline are invited to complete the staff satisfaction survey. It is estimated that 60 nursing staff are eligible to the survey.

4.3.4 Timing and frequency of taking measurement

Data for evaluation will be collected by the operation team on a weekly basis. The staff satisfaction questionnaire will be delivered to nurses after completing the training session and at the end of the first month of program implementation. Short term evaluation will be carried out by the operation team at the end of the first month. Nursing staff's acceptability towards the new guideline and clients' outcome will be investigated. When necessary, immediate revision of the program will be performed and more briefing sessions will be provided for staff to understand more about the innovation.

The program implementation will last for 6 months and evaluation will be performed and will last for two months after implementation. Nursing staff will be invited to complete the satisfaction survey again at the end of the program. Staff morale can be reflected from annual sick leave rate. The total cost for establishment and sustaining the program will be reflected from the annual expenditure of our service.

4.3.5 Data analysis
The objective of the primary outcome is to increase the affirmative response to sensitive behaviors such as homosexual orientation, risk behavior and STI history. To compare the affirmative response of these sensitive behaviors by interview mode, reports generated in CASI and the traditional face-to-face interview will be analyzed by the two tailed paired t-test. The objectives of the secondary outcomes are to increase the STI diagnosis reported by the monthly statistics of our service and the clients' satisfaction level. Clients’ satisfaction level can be measured by the 5-point Likert scale satisfaction survey which "excellent" counts as 5 points and "unsatisfactory" counts as 1 point. The survey will be analyzed by the computer system Statistical Package for Social Sciences (SPSS) using one group post-test design with 95% confident interval.

To evaluate the healthcare provider outcome, nurses’ knowledge and satisfaction level towards CASI will be measured by the staff satisfaction survey using 5-point Likert scale which "excellent" counts as 5 points and "unsatisfactory" counts as 1 point. The survey will also be analyzed by SPSS using one group post-test design with 95% confident interval.

The running cost of CASI includes maintenance of tablet computers or devices, software updates and protective screen replacement. It will be reported during the nursing officer meeting at the end of the entire program implementation.

4.3.6 Basis for adopting the protocol
The innovation is regarded to be effective if it fulfilled the required basis of patient, healthcare and system outcomes. With regard to patient outcomes, the innovation is considered to be effective if the affirmative response of sensitive behaviors using CASI increases 20% comparing to the tradition face-to-face interview. Apart from this, it is believed that the number of STI diagnosis will increase as more risky behavior are reported using CASI. Also, clients should perceive CASI as a more private and confidential interview mode and it is likely that they may be more satisfied with it and therefore achieving a higher satisfaction rate, i.e. to achieve 70% satisfaction by the client satisfaction survey.

For healthcare provider outcomes, the innovation is considered to be effective if it is highly acceptable and satisfied by frontline staff. The objective is to obtain staff satisfaction of 80%. The reduction in workload of nursing staff may increase staff morale and there should be a reduction in annual sick leaves.

Finally, the system outcome is considered to be effective if it causes a 50% reduction in manpower for conducting interview and the annual running cost of the innovation is kept below $4000.
References


sexual behaviour questionnaire delivery modes in Zimbabwean youth. *Sexually transmitted infections.*


Appendices

Appendix I

Literature Search History: 11 August 2014 - 28 August 2014

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Identification

Screening

Eligibility

Included

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ineligible populations (n=5)
## Appendix II

### Table of evidence

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Households from three cities in different geographic regions

Mean age (range): 30.1 years (15-49)

to headphones, then entered responses using a laptop keyboard, without presence of interviewer (n=1540)

SA group:
Respondents self-administered paper-and-pencil questionnaire (n=1540)

Refusal rate for question on:

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<tr>
<td>(4) premarital sex</td>
<td>3.4%</td>
<td>8% (PI) vs 10.4% (SA)</td>
</tr>
<tr>
<td>(5) drug use</td>
<td>0.5%</td>
<td>0.4% (PI) vs 1.9% (SA)</td>
</tr>
<tr>
<td>(6) sex with a sex worker</td>
<td>0.1%</td>
<td>0.9% (PI) vs 2.2% (SA)</td>
</tr>
<tr>
<td>(7) Mean no. of sexual partner in previous 12 months in married respondents</td>
<td>1.34 (95% CI 1.21-1.47)</td>
<td>1.04 (95% CI 1.02-1.06) vs 1.16 (SA) (95% CI 1.10-1.21) vs 1.04 (PI) (95% CI 1.02-1.06) vs 1.16 (SA) (95% CI 1.10-1.21)</td>
</tr>
<tr>
<td>Langhaug et al. (2011)</td>
<td>1495 male and female pupils</td>
<td>ACASI: Respondents click on a mouse for choosing responses using a laptop computer while listening through headphones (n=381)</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Setting: Rural communities in 3 provinces in eastern Zimbabwean</td>
<td>Mean age (range): 18.2 years (15-23)</td>
<td></td>
</tr>
</tbody>
</table>
| Paper questionnaire with all instructions written into the questionnaire booklet (n=373) | ASAQ group: SAQ accompanied by audio soundtrack on CD player (n=376) | their response in round 2  
(7) Negative conversions in round 2: participants who reported had sex in round 1 reported they had sex in round 2 | (ICVI) vs 33.3% (ASAQ)(p=0.07) |
<p>| Richens et al. (2010)/U.K., RCT (+) | 2351 male and female patients with a new clinical episode | Setting: Two Large sexual health clinics in London | Age over 16 years | CASI: Electronic interview was performed in private using a tablet (touch-screen) computer. (n=801) | CAPI group: Patient and clinician viewing the computer together, data input by the clinician. (n=763) | PAPI group: Pen and paper interview by a clinician. (n=787) | N/A | Primary: (1) STI diagnostic testing pattern (2) STI diagnosis Secondary: (3) Uptake of testing: (3a) HIV testing (3b) HBV testing (3c) HCV testing (3d) Rectal sample (4) Rates of STI diagnosis (5) Identification of indications for post-coital | (1) Not tested for STI OR (CASI to PAPI) =0.86 (95% CI, 0.72 to 1.03) Other testing pattern did not differ significantly (2) Highest among CAPI, but did not differ significantly (3a) OR (CASI to PAPI)=0.73 (95% CI, 0.59 to 0.90) (3b) OR (CASI to PAPI)=1.02 (95% CI, 0.78 to 1.33) (3c) OR (CASI to PAPI)=1.17 (95% CI, 0.66 to 2.09) (3d) OR (CASI to PAPI)=1.01 |</p>
<table>
<thead>
<tr>
<th>contraception</th>
<th>(6) Referral to health advisers</th>
</tr>
</thead>
<tbody>
<tr>
<td>(7) Rates of disclosure of risky sexual behaviors</td>
<td>(4) No significant difference</td>
</tr>
<tr>
<td>(5) OR (CASI to PAPI) =2.14</td>
<td>(95%CI, 1.46 to 3.13)</td>
</tr>
<tr>
<td>(6) No significant difference</td>
<td></td>
</tr>
<tr>
<td>(7) Summary OR (CASI to PAPI)=1.41</td>
<td></td>
</tr>
<tr>
<td>(95%CI, 1.2 to 1.65)</td>
<td></td>
</tr>
<tr>
<td>Summary OR (CAPI to PAPI)=1.42 (95%CI, 1.21 to 1.66)</td>
<td></td>
</tr>
<tr>
<td>Hewett et al. (2008)/ Brazil, RCT (+)</td>
<td>818 female clients</td>
</tr>
<tr>
<td>age(range):</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>I: 27.5 years (18-40)</td>
<td>C: 27.7 years (18-40)</td>
</tr>
</tbody>
</table>

(a) Not using condom during vaginal sex
(b) with a partner in the last 6 months who has been in prison and not using a condom during vaginal sex
(6) Reporting of sexual behavior in STI-negative women:
(a) Having anal sex within the last 6 months
(b) never use a condom during vaginal sex in the last month
<p>| Le et al. (2005)/ Vietnam, RCT (+) | 2761 male and female youths | ACASI: Questionnaires were voice recorded into computer software. Respondents answer by clicking number keypad. (n=906) | SA group: Questionnaires with instructions for self-administered paper-pencil interview. (n=929) | N/A | Reporting of sexual behaviors: (PI as comparison, OR=1) (1) Ever had sex (age15-19yrs) (2) Ever had sexual intercourse with a sex worker (age 20-24yrs) (3) Ever had sexual intercourse with a sex worker (Male) | (1) 2.79 vs 1.36 (SA)(p&lt;0.05, CI 95%) (2) 2.05 vs 0.23(SA)(p&lt;0.05, CI 95%) (3) 2.33 vs 0.3(SA)(p&lt;0.05, CI 95%) |</p>
<table>
<thead>
<tr>
<th>Study</th>
<th>Sample Size</th>
<th>Setting</th>
<th>Age Range</th>
<th>Interview Administration</th>
<th>Reporting of Sexual Behaviors</th>
<th>Significance Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hewett et al. (2004)/Kenya, RCT (0)</td>
<td>700 female resident</td>
<td>Household of Kisumu (one of the highest HIV rates in Kenya)</td>
<td>15-21</td>
<td>ACASI: Respondents listened to questions through headphones and answered by pressing a mini keyboard that correspond to a recorded response category. (n=306)</td>
<td>An exit face-to-face interview conducted immediately after main interview</td>
<td>(1) OR (ACASI to FTFI)=NS (3) OR (ACASI to FTFI)=6.26 (p&lt;0.001) (4) OR (ACASI to FTFI)=42.6 (p&lt;0.001) (5) OR (ACASI to FTFI)=3.45 (p&lt;0.001) (6) OR (ACASI to FTFI)=3.55 (p&lt;0.001) (7) OR (ACASI to FTFI)=3.62 (p&lt;0.001) (8) OR (ACASI to FTFI)=2.74 (p&lt;0.001) (9) OR (ACASI to FTFI)=2.73 (p&lt;0.01) (10) 12% vs 7% (Interviewer...</td>
</tr>
<tr>
<td>Consistency in reporting ever had sexual intercourse:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(8) Coerced sex (locked in a room)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(9) Coerced sex (physically forced)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(10) reported &quot;yes&quot; in main interview changed to &quot;no&quot; in exit interview</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(11) reported &quot;no&quot; in main interview changed to &quot;yes&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(11) 27% vs 8% (Interviewer administered interview)
List of abbreviations:

ACASI: Audio computer-assisted self interview
ASAQ: Audio self-assisted questionnaire
C: Control
CAPI: Computer-assisted personal interview
CASI: Computer-assisted self interview
CI: Confident interval
FTFI: Face-to-face interview
HBV: Hepatitis B virus
HCV: Hepatitis C virus
HIV: Human immunodeficiency virus
I: Intervention
ICVI: Informal confidential voting interview
N/A: Not available
NS: Not significant
OR: Odd ratio

PAPI: Pen and paper interview

PI: Personal interview

RCT: Randomized controlled trial

SA: Self-administered paper-and-pencil interview / Self-administered interview

SAQ: Self-administered questionnaires

STI: Sexually transmitted infection
Appendix III

Quality assessment of the Randomized Controlled Trial

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Section 1: Internal Validity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1 The study addresses an appropriate and clearly focused question</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>1.2 The assignment of subjects to treatment group is randomised</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Can't say</td>
</tr>
<tr>
<td>Only mentioned &quot;randomly assigned&quot;; No description on randomization method.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.3 An adequate concealment method is used</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

71
<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1.4 Subjects and investigators are kept 'blind' about the treatment</strong></td>
<td>Not applicable</td>
<td>Not applicable</td>
<td>Not applicable</td>
<td>Not applicable</td>
<td>Not applicable</td>
</tr>
<tr>
<td><strong>1.5 The treatment and control groups are similar at the start of the trial</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Can't say</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>1.6 The only difference between groups is the treatment under investigation</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>1.7 All relevant outcomes are measured in a standard, valid and reliable way</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>1.8 What percentage of the individuals or clusters recruited into</strong></td>
<td>ACASI (I): 14.5%</td>
<td>Round 1: no drop out</td>
<td>CASI (I): 0.75%</td>
<td>No drop out</td>
<td>ACASI (I): 14.9%</td>
</tr>
<tr>
<td></td>
<td>SA (C): 11.8%</td>
<td>CASI (I): 2.49%</td>
<td>CAPI(C): 2.49%</td>
<td></td>
<td>SAI(C): 13.7%</td>
</tr>
</tbody>
</table>
each treatment arm of the study dropped out before the study was completed?

<table>
<thead>
<tr>
<th></th>
<th>PI (C): 10.8%</th>
<th>Round 2: ACASI (I): 48.9%</th>
<th>PAPI(C): 1.01%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Overall: 12.4%</td>
<td>Overall: 38%</td>
<td>Overall: 1.42%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.9 All the subjects are analysed in the groups to which they were randomly allocated (often referred to as intention to treat analysis)</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Not applicable</td>
</tr>
<tr>
<td>1.10 Where the study is carried out at more than one site, results are comparable for all sites</td>
<td>Can't say</td>
<td>Can't say</td>
<td>Can't say</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Only rural and urban results were compared</td>
<td>No specific data was given</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>No specific data was given</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Not applicable</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Not applicable</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Not applicable</td>
</tr>
</tbody>
</table>
## Section 2: Overall Assessment of The Study

### 2.1 How well was the study done to minimise bias?

Code as follows.

<table>
<thead>
<tr>
<th>High quality(+++)</th>
<th>Acceptable(+)</th>
<th>Unacceptable-reject 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>++</td>
<td>++</td>
<td>+</td>
</tr>
</tbody>
</table>

### 2.2 Taking into account clinical considerations, your evaluation of the methodology used, and the statistical power of the study, are you certain that the overall effect is due to the study intervention?

- Yes, the study provided 90% power in significance of 95%, \( p=0.05 \), difference to be detected was 10%.
- Yes, the study provided 85% power to detect a RR of 0.5 (or 2.0) in at least one group.
- Yes, the study provided 80% power to detect 35% relative increase in enhanced screening or 27% relative increase in STI diagnosis, based on a significance level of 0.05.
- Yes, the study provided 80% power, \( p=0.05 \), minimum 10% effect size by interview mode.
- Yes, the study provides 80% power, at an alpha value of 0.05.
<table>
<thead>
<tr>
<th>2.3 Are the results of this study directly applicable to the patient group targeted by this guideline?</th>
<th>Yes</th>
<th>Yes</th>
<th>Yes</th>
<th>Yes</th>
<th>Yes</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.4 Summarize the authors' conclusions. And any comments on your own assessment of the study, and the extent to which it answers your question and mention any areas of uncertainty raised above.</td>
<td>ACASI yielded more reliable affirmative responses in sensitive issues than SA and PI. The item refusal rates were higher in SA and PI compared to ACASI.</td>
<td>ACASI produced a lower non-response rate and higher rates of reporting sensitive behaviors than Audio-SA Q, SAQ and ICVI.</td>
<td>CASI increased the disclosure of sexual risk behaviors. CASI was linked to additional STI testing without increased rate of STI diagnosis. The HIV test uptake rate was the lowest in CASI.</td>
<td>ACASI produced more valid reports of behavior than FTFI. Significant association s between STIs and behaviors were found, particularly in ACASI.</td>
<td>ACASI produced higher reporting rate for sensitive behaviors.</td>
<td>ACASI produced higher reporting rate for sensitive behaviors. ACASI increased rate of inconsisten t reports.</td>
</tr>
</tbody>
</table>
### Appendix IV

**Program Calendar**

<table>
<thead>
<tr>
<th>Task</th>
<th>Preparation</th>
<th>Pilot</th>
<th>Implementation</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seek approval</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Program development</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preparation of materials</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Staff training</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pilot test</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Pilot test evaluation</td>
<td></td>
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</tr>
<tr>
<td>Program modification</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fully implementation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collection of reports</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Analyzing reports</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Staff satisfaction survey</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Program evaluation</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
## Appendix V

**Expenditure of implementing CASI**

### Materials

<table>
<thead>
<tr>
<th>Material</th>
<th>Amount</th>
<th>Cost / Item</th>
<th>Total cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tablet computer with headphone</td>
<td>16</td>
<td>$3000</td>
<td>$48000</td>
</tr>
<tr>
<td>Protective screens</td>
<td>16</td>
<td>$50</td>
<td>$800</td>
</tr>
<tr>
<td>User manual</td>
<td>8</td>
<td>$30</td>
<td>$240</td>
</tr>
</tbody>
</table>

Total material cost $49,040

### Staff

<table>
<thead>
<tr>
<th>Staff</th>
<th>Job description</th>
<th>Hour</th>
<th>Cost / Hour</th>
<th>Total cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nurse</td>
<td>Proposer and supervisor take part in 2 half-day</td>
<td>2x2x4.4=17.6</td>
<td>$168</td>
<td>$2957</td>
</tr>
<tr>
<td></td>
<td>meetings</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Operation team take part in 4 one-hour team</td>
<td>10x4x1=40</td>
<td></td>
<td>$6720</td>
</tr>
<tr>
<td></td>
<td>meeting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 hour briefing session for all nursing staff</td>
<td>1x80=80</td>
<td></td>
<td>$13440</td>
</tr>
</tbody>
</table>

77
Total cost for setting up the innovation is $78,493.

<table>
<thead>
<tr>
<th>Items</th>
<th>Amount</th>
<th>Cost / Item</th>
<th>Total cost / Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tablet computer maintenance</td>
<td>Regular annual</td>
<td>$100</td>
<td>$1600</td>
</tr>
<tr>
<td></td>
<td>check-up</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Software updates</td>
<td>Annual update</td>
<td>$2,000</td>
<td>$2000</td>
</tr>
<tr>
<td>Protective screen replacement</td>
<td>2 / year</td>
<td>$50</td>
<td>$100</td>
</tr>
<tr>
<td>Total running cost per year</td>
<td></td>
<td></td>
<td>$3700</td>
</tr>
</tbody>
</table>
Appendix VI

Evidence-based guideline

Practice Guideline: Use of computer-assisted self-interviewing (CASI) among clients attending sexually transmitted infection clinic

Introduction:

There is sufficient evidence showing CASI improves clients' response rates to sensitive behaviors. The accurate results generated are clinically useful and lead to more beneficial health outcomes. Reliable reports of sensitive behaviors also help in investigation of sexually transmitted infection trends and developing further surveillance or preventive initiatives (Le & Vu, 2012; Langhaug et al., 2011; Richens et al., 2010; Hewett et al., 2008; Le et al., 2005; Hewett et al., 2004).

An evidenced-based CASI guideline is developed for pre-consultation interview and interview-based research in sexually transmitted infection clinics. The purpose of this guideline is to develop a standardized electronic self-interview system to encourage disclosure of sensitive behaviors among clients attending STI clinic. It is developed based on the evidence of the retrieved literatures. The literatures were graded according to the Level of
Evidence (SIGN, 2012) and the recommendations generated from the retrieved literatures were graded by Grades of Recommendations (SIGN, 2012).

**Objective:**

1. To provide recommendations based on current evidence for developing a CASI system in local sexually transmitted infection clinics;

2. To increase disclosure of sensitive behaviors among clients attending sexually transmitted infection clinic

**Target population:**

Clients age over 16 years and attending STI clinic for medical consultation

**Exclusion population:**

1. Clients who are illiterate;

2. Clients with problem of reading or tapping the computer screen;

3. Clients who have mental disability

**Recommendations with evidence:**

**Recommendation 1**
In clients attending STI clinic for medical consultation, CASI should be offered in the absence of an interviewer.

**Grade of recommendation: A**

**Available evidence:**

In the absence of an interviewer, clients reported more truthful answers and lower refusal rates in sensitive questions. Also, a more diverse picture of sexual activities in adolescent girls was observed. To conclude, clients would disclose more sensitive and clinically useful information when using CASI, resulted in more beneficial health outcomes (Le et al., 2012; Langhaug et al., 2011; Richens et al., 2010; Hewett et al., 2004).

**Recommendation 2**

Clients should be assigned to private rooms or isolated from the main clinic room by protective screen when completing CASI.

**Grade of recommendation: A**

**Available evidence:**

Greater degree of privacy and confidentiality offered during interview would increase disclosure of sensitive, stigmatized behaviors (Hewett et al., 2008).
Recommendation 3

The CASI program should be configured so that clients can read the question displayed on the computer screen while concurrently listening to the question through audio-headphones. The audio soundtrack should be recorded with gender-specific voices, i.e. male hear a male voice, in a non-judgmental and empathetic manner.

Grade of recommendation: A

Available evidence:

Clients reported easy to understand the question when read aloud (Langhaug et al., 2011). Audio computer-assisted self-interviewing (ACASI) increases affirmative response rate of adolescents with regard to sensitive sexual behaviors (Le et al., 2005).

Recommendation 4

The CASI questionnaire should include the following main sections:

1. Personal background
2. Pregnancy and childbearing
3. Sexual orientation
4. Sexually transmitted disease history
5. Sexual experience and risk exposure

6. Human immunodeficiency virus (HIV) awareness

The questionnaire is transferred to a database and installed on computers.

**Grade of recommendation:** A

**Available evidence:**

Response rates are affected by the format and wording of the electronic questionnaire (Richens et al., 2010). Increased affirmative responses in sensitive issues including premarital sex and sexual behavior were reported (Le & Vu, 2012; Le et al., 2006).

**Recommendation 5**

CASI should provide information about routine STI screening including HIV test.

Recommendation relevant STI tests should be displayed at the end of the interview.

**Grade of recommendation:** A

**Available evidence:**

CASI should be designed in a way to encourage clients committing HIV test as promote HIV screening is one of the goals of STI clinic. The recommended STI test displayed at the end of
the interview would facilitate discussion with clinicians following CASI (Richens et al., 2010).

**Recommendation 6**

CASI should highlight the tests which clients have initially refused so that clinicians can introduce the relevant tests for clients when they do not follow the criteria.

**Grade of recommendation: A**

**Available evidence:**

Clients completed CASI may have their own recommendation on STI tests before the medical consultation. Clinicians introduce the tests to clients who do not follow the suggestions can encourage them to commit STI testing (Richens et al., 2010).

**References:**


Appendix VII

Client evaluation on CASI pilot testing

This questionnaire inquires about your satisfaction level about the Computer-assisted self-interviewing (CASI) system training session.

Please tick [ ] the appropriate column that best corresponds to your rating for each question.

Excellent 5   Good 4   Average 3   Week 2   Unsatisfactory 1

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
<th>Performance Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Are the questions easy to understand?</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Are the questions asked in an appropriate, non-offensive manner?</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Can you seek help from healthcare providers when you encounter difficulties in using CASI?</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Is your privacy ensured during the self-interview?</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Do you feel comfortable during the self-interview?</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>How would you rate your satisfaction level for CASI?</td>
<td></td>
</tr>
</tbody>
</table>

What do you think might make CASI better?

Please feel free to give additional comments.

End of the survey. Thank you for your participation.
Appendix VIII

Evaluation on CASI training session

This questionnaire inquires about your satisfaction level about the Computer-assisted self-interviewing (CASI) system training session.

Please tick [✓] the appropriate column that best corresponds to your rating for each question.

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
<th>Excellent 5</th>
<th>Good 4</th>
<th>Average 3</th>
<th>Week 2</th>
<th>Unsatisfactory 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Is the content of the training session relevant?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Is the content clearly presented?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Are there sufficient demonstrations for using CASI?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Are there sufficient practices for using CASI?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>How would you rate your knowledge of CASI?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>How would you rate your confident level of using CASI?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Is there sufficient time for discussion?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Is the duration of the training session appropriate?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Overall, how would you rate this training session?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

What do you think might make CASI or this training session better?

End of the survey. Thank you for your participation.
Appendix IX

Staff satisfaction survey on CASI

This questionnaire inquires about your satisfaction level about the Computer-assisted self-interviewing (CASI) system.

Please tick [ □ ] the appropriate column that best corresponds to your rating for each question.

Excellent 5  Good 4  Average 3  Week 2  Unsatisfactory 1

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
<th>Performance Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Is the instrument used in CASI relevant?</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>2</td>
<td>Is CASI user-friendly?</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Does CASI shorten the time for pre-consultation interview?</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>How would you rate your skill level about CASI?</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>How would you rate the technical supports for CASI?</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>In general, do you think CASI is efficient?</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>In general, do you satisfied with CASI?</td>
<td></td>
</tr>
</tbody>
</table>

What did you like most about CASI?

What do you think might make CASI better?

Please feel free to give additional comments.

End of the survey. Thank you for your participation.
# Appendix X

## Client evaluation on CASI

This questionnaire inquires about your satisfaction level about the Computer-assisted self-interviewing (CASI) system.

Please tick [✓] the appropriate column that best corresponds to your rating for each question.

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
<th>Performance Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Are the questions asked in CASI clear?</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>2</td>
<td>Is CASI easy to use?</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>3</td>
<td>Does CASI reduce embarrassment when answering sensitive questions?</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>4</td>
<td>Does a private environment provided for you to complete CASI?</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>5</td>
<td>In general, do you think CASI is efficient?</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>6</td>
<td>In general, do you satisfied with CASI?</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>7</td>
<td>In general, do you satisfied with our service?</td>
<td>5 4 3 2 1</td>
</tr>
</tbody>
</table>

End of the survey. Thank you for your participation.