Annex 1. Evidence search strategies and results

For *Guideline on Use of Devices for Male Circumcision for HIV Prevention*, October 2013

Literature search

General procedures

- The following electronic databases were searched:
  - A. General databases
    - PubMed
    - POPLINE
    - Web of Science/Web of Knowledge
    - Cochrane Central Database of Systematic Reviews
    - WHO regional databases
      - AFRO
      - AMRO/PAHO
      - EMRO (not accessible)
      - EURO
      - SEARO
      - WPRO
    - EMBASE
  - B. Clinical trials databases
    - Clinicaltrials.gov
    - Controlled-trials.com
    - Who.int/trialsearch
    - IFPMA Clinical Trials Portal: ifpma.org/clinicaltrials.html
- Medical subject headings (MeSH) were used in addition to key words to maximize sensitivity and specificity of searches.
- Secondary reference searching was also conducted on all articles included in the review as well as in past systematic reviews and meta-analyses.
- Conferences searched included:
    - International AIDS Society, International AIDS Conference
    - International AIDS Society Conference on HIV Pathogenesis, Treatment, and Prevention
    - European AIDS Society Conference
    - US National HIV Prevention Conference
    - British HIV/AIDS Association (BHIVA)
- Articles and citations were downloaded, organized, and reviewed.

Inclusion criteria

To be included in the systematic review and GRADE process, an article had to meet the following criteria:

1) published in a peer-reviewed journal or presented as a peer-reviewed abstract at a scientific meeting.
2) include information that is pertinent to the PICO question.
3) published since 01 January 2001 (date limited as devices that might have been considered in the context of the purpose of HIV prevention were the priority; the potential of male circumcision as a HIV prevention intervention became a global priority for study after a meeting held in late 2000).

Screening abstracts

Two reviewers independently screened the titles and abstracts of citations identified through the search strategy for potential eligibility. Full-text articles were obtained for all abstracts considered likely to be eligible. Two reviewers independently reviewed each such article to determine whether it met the inclusion criteria. Differences between the two reviewers were discussed and resolved through consensus or by a neutral arbiter.

Data extraction and management

Two reviewers extracted data using standardized data extraction spreadsheets. Differences in data extraction were resolved through consensus or in discussion with a neutral arbiter. The following information was gathered from each included study:

- Study identification; author(s); type of citation; year of publication
- Study description: location, setting and target group; years (period of study); description of the intervention; comparison groups; study design; sample size; age range, gender; random or non-random allocation of participants; length of follow-up (all if applicable)
- Outcomes and results: outcome measures; effect sizes; confidence intervals; significance levels
- Other information: limitations; references for follow-up; secondary effects/adverse effects.

Search terms and results

1) PubMed searched on 14 June 2012, limited to publications since 1 January 2001, using the following search terms:

   ((“Circumcision,Male”[Mesh] OR “uncircumcised”[All Fields] OR “circumcision”[All Fields] OR "circumcisions" [All Fields] OR "circumcised" [All Fields]) AND (“Male” [MESH] OR “male” [all fields] OR “males” [all fields] OR “men”[Mesh] OR “man” [all fields] OR “men” [all fields] OR “boy” [all fields] OR “boys” [all fields] OR “youth”[All Fields] OR “adolescent”[All Fields] OR “adolescent”[MeSH] OR “adolescents”[All Fields] OR “prepubescent”[All Fields] OR “pre-pubescent”[All Fields] OR “pre-pubertal”[All Fields] OR “postpubescent”[All Fields] OR “post-pubescent”[All Fields] OR “post-pubertal”[All Fields]))
   AND
   (“device”[All Fields] OR “devices”[All Fields] OR “compression”[All Fields] OR “ligature”[All Fields] OR “crush”[All Fields] OR “template”[All Fields] OR “kit”[All Fields] OR “appliance”[All Fields] OR “appliances”[All Fields] OR “instrumentation”[SH] OR “equipment design”[MeSH] OR “clamp”[All Fields] OR “ring”[All Fields] OR “self-use”[All Fields] OR (“self” [All Fields] AND “applied” [All Fields]) OR “self-applied”[All Fields] OR “wearable”[All Fields] OR “bell”[All Fields] OR “tourniquet”[All Fields] OR “disposable”[All Fields] OR “plastic”[All Fields] OR “cutter”[All Fields] OR “elastic”[All Fields] OR “collar”[All Fields] OR “vice”[All Fields] OR “reusable”[All Fields] OR “latch”[All Fields] OR (“minimally” [All Fields]) AND “invasive” [All Fields] or "Equipment and Supplies"[Mesh] or "apparatus" [All Fields]
   OR
   “gomco” OR “prepex” OR “accucirc” OR “accu-circ” OR “mogen” OR “ismail” OR (“smart” AND “klamp”) OR “smartklamp” OR “TaraKLamp” OR (“Tara” AND “klamp”) OR “kirve” OR “sunathrone” OR “plastibell” OR “zhenxi” OR (“ali’s” AND “clamp”) OR “alisklamp” OR (“ali” AND “clamp”) OR (“ali” AND “klamp”) OR “shangring” OR (“shang” AND “ring”) OR “circ-ring” OR “shenghuan disposable minimally invasive” OR “winkelmann” OR “ross ring” OR “clip-and-wear” OR (“clip” AND “wear”) OR “smartcircumcision” OR “circclamp”)

2) EMBASE was searched on 17 July 2012, limited to publications since 1 January 2001, using the following search terms:

   ‘gomco’ OR ‘prepex’ OR ‘accucirc’ OR ‘accu-circ’ OR (mogen:ti,ab (hiv OR circumcision)) OR (ismail:ti,ab and (hiv OR circumcision)) OR (‘smart’ AND ‘klamp’) OR ‘smartklamp’ OR ‘TaraKLamp’ OR (‘Tara’ AND ‘klamp’) OR ‘kirve’ OR ‘sunathrone’ OR ‘plastibell’ OR ‘zhenxi’ OR

('ali s' AND 'clamp') OR 'alisklamp' OR ('ali' AND 'clamp') OR ('ali' AND 'klamp') OR 'shangring' OR (shang:ti,ab AND 'ring') OR 'circ-ring' OR 'shenghuan disposable minimally invasive' OR (winkelmann:ti,ab AND (hiv OR circumcision)) OR 'ross ring' OR 'clip-and-wear' OR ('clip' AND 'wear') OR 'smartcircumcision' OR 'circclamp' or mogen:dn OR ismail:dn or Winkelmann:dn

3) Overall results of the PubMed and EMBASE searches:

PubMed search results:

Total records: 426

Records excluded: 416

Full text articles obtained: 10 (including 3 translated from Chinese)

Studies included in review: 9

EMBASE search results:

Total records: 230

Duplicates removed: 41

Records screened: 189

Records excluded: 166

Full-text articles obtained: 27 (including 2 translated from Chinese and 1 from Korean)

Studies included in review: 4

Total studies included in review: 9 + 4 = 13, as follows:

1. Barone MA ert al. The Shang Ring device for adult male circumcision: A proof of concept study in Kenya. *Journal of Acquired Immune Deficiency Syndrome*, 2011, 57:e7-e12.
2. Barone MA et al. Randomized trial of the Shang Ring for adult male circumcision with removal at one to three weeks: Delayed removal leads to detachment. *Journal of Acquired Immune Deficiency Syndrome*, 2012, 60(3):e82-e9.
3. Bitega JP et al. Safety and efficacy of the PrePex device for rapid scale-up of male circumcision for HIV prevention in resource-limited settings. *Journal of Acquired Immune Deficiency Syndrome*, 2011, 58(5):e127-e34.
4. Bo L et al. Comparative study on the effects of Plastibell device circumcision and conventional circumcision in treatment of excess foreskin and phimosis. *Chinese Journal of Andrology*, 2011, 25(10):51–57.
5. Cheng Y et al. [A recommendable standard protocol of adult male circumcision with the Chinese Shang Ring: outcomes of 328 cases in China]. ~~*Asian*~~ *Journal of Andrology*, 2009, 15(7):584–592.
6. Hinev A. Initial results of male circumcision with the Shangring™ device. *Urology*, 2011, 78(3):s144.
7. Jung JH, Lee, SB, Song JM. A new convenient device of circumcision. *Korean Journal of Urology*, 2006, 47(10):1099–1102.
8. Lagarde E et al. High rate of adverse events following circumcision of young male adults with the Tara KLamp technique: a randomised trial in South Africa. *South African Medical Journal*, 2009, 99(3):163–169.

9. Li HN, Xu J, Qu L.M. [Shang Ring circumcision versus conventional surgical procedures: comparison of clinical effectiveness]. *Asian Journal of Andrology,* 2010, 16(4):325–327.

10. Musau P et al. The safety profile and acceptability of a disposable male circumcision device in Kenyan Men Undergoing Voluntary Medical Male circumcision. *The Journal of Urology,* 2011, 186(5):1923–1927.

11. Mutabazi V et al. HIV prevention: male circumcision comparison between a non-surgical device to a surgical technique in resource-limited settings: a prospective, randomized, non-masked trial. *Journal of Acquired Immune Deficiency Syndrome*, 2012, 61(1):49–55.

12. Peng YF et al. [Standardized male circumcision with Shang Ring reduces postoperative complications: a report of 351 cases]. *National Journal of Andrology*, 2010,16(11):963–966.

13. Peng YF et al. Clinical application of a new device for minimally invasive circumcision. *Asian Journal of Andrology,* 2008, 10(3):447–454.

4) Conferences searched in December 2012 provided the following additional results:

1. Sokal DC et al. Randomized controlled trial of the Shang Ring versus conventional surgical techniques for adult male circumcision in Kenya and Zambia (TUAC0404). XIX International AIDS Conference; 22–27 July 2012; Washington, DC. (http://pag.aids2012.org/abstracts.aspx?aid=13071).

2. Mutabazi V et al. One arm, open label, prospective, cohort field study to assess the safety and efficacy of the PrePex device for scale-up of non-surgical circumcision when performed by nurses in resource-limited settings for HIV prevention (TUAC0405). XIX International AIDS Conference; 22–27 July 2012; Washington, DC. (http://pag.aids2012.org/abstracts.aspx?aid=6858).

Reports of ongoing or completed but unpublished studies

In addition, investigators known to be studying the use of MC devices in African countries were contacted. The investigators made confidential final reports from completed studies and interim reports from ongoing studies available to WHO for review by the TAG. Clarifications were sought from the study investigators where necessary. The following interim and final reports were included in the review:

1. FHI 360. The Shang Ring: Evaluation of healing at three time intervals and potential for spontaneous detachment [Confidential statistical report and tables, Study #10214]. Durham, NC, USA: FHI 360, 27 April 2011.

2. Sokal DC et al. Randomized controlled trial of the Shang Ring versus conventional surgical techniques for adult male circumcision in Kenya and Zambia (TUAC0404). XIX International AIDS Conference; 22–27 July 2012, Washington, DC.

3. Sokal DC et al. Randomized controlled trial of a minimally invasive circumcision device, the Shang Ring, versus conventional surgical techniques for adult male circumcision: safety and acceptability [Submitted for publication 2013].

4. FHI 360. Comparison of the Shang Ring with conventional surgical methods: A Randomized controlled trial (RCT10220) [Confidential statistical report and tables]. Durham, NC, FHI 360, July 2012.

5. Sokal DC et al. A field study of male circumcision using a minimally-invasive device, the Shang Ring, in routine clinical settings in Kenya and Zambia. [Report to the Technical Advisory Group on Innovations in Male Circumcision, World Health Organization]. Durham, NC, USA, FHI 360, 29 October 2012.

6. FHI 360. A prospective observational study of male circumcision using the Shang Ring in routine clinical settings in Kenya and Zambia [Confidential Statistical report and tables, Study #10278]. Durham, NC, FHI 360, 25 October 2012.

7. Kigozi G et al. The acceptability and safety of the Shang Ring for adult male circumcision in Rakai, Uganda. [Submitted for publication 2013].

8. Mutabazi V et al. One arm, open label, prospective, cohort field study to assess the safety and efficacy of the PrePex device for scale-up of non-surgical circumcision when performed by nurses in resource-limited settings for HIV prevention (TUAC0405). XIX International AIDS Conference; 22–27 July 2012; Washington, DC.

9. Mutabazi V et al. One-arm, open-label, prospective, cohort field study to assess the safety and efficacy of the PrePex device for scale-up of nonsurgical circumcision when performed by nurses in resource-limited settings for HIV prevention. [Submitted for publication 2013].

10. Mutabazi V et al. One arm, open label, prospective, cohort field study to assess the safety and efficacy of the PrePex™ device for scale up of non-surgical circumcision when performed by nurses in resource limited settings for hiv prevention (Protocol RMC-03). 10 January 2012.

11. Tshimanga M et al. Evaluation of safety and efficacy of PrePex™ device for male circumcision in Zimbabwe. Phase I: Device safety trial report. Harare, Zimbabwe, Ministry of Health and Child Welfare, January 2013.

12. Tshimanga M et al. A randomized controlled trial comparing the PrePex™ device to forceps guided surgical circumcision for rapid scale-up of male circumcision in Zimbabwe. Phase II: Randomized trial report. Harare, Zimbabwe, Ministry of Health and Child Welfare, January 2013.

13. Tshimanga M et al. Evaluation of safety and efficacy of PrePex™ device for male circumcision in Zimbabwe. Phase 3: Cohort field study on safety and efficacy of the PrePex circumcision device when performed by nurses. Harare, Zimbabwe, Ministry of Health and Child Welfare, January 2013.

14. Galukande M et al. Interim report. HIV prevention: Safety study of a non-surgical device for adult male circumcision with no injected anesthesia in a non sterile setting, January 2013. Kampala, Uganda: Confidential report for International Medical Group (IMG), 16 January 2013.

15. Kigozi G. Acceptability and safety of the PrePex device for male circumcision: Rakai (UO1 AI075115-0451). Kalisizo, Rakai, Uganda, Rakai Health Sciences Program (RHSP), 22 January 2013.