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# Efficacy of Current Sanitation Recommendations at Reducing Rates of Toxic Shock Syndrome in Menstruating Women Using a Menstrual Cup

Alexa Gingerich  
*Rowan University*

Antonia Conti  
*Rowan University*

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# Efficacy of Current Sanitation Recommendations at Reducing Rates of Toxic Shock Syndrome in Menstruating Women Using a Menstrual Cup

Alexa Gingerich, OMS III and Antonia Conti OMS-III

## Background

- Menstrual toxic shock syndrome (mTSS) is a rare but serious complication associated with the prolonged use of intra-vaginal menstrual products that was discovered in 1978.
- Toxigenic species of staphylococcus aureus, a bacteria common to the vaginal microbiome, produce toxic shock syndrome toxin (TSST)
- TSST causes immune overreaction that leads to fever, hypotension, rash, and end-organ damage.<sup>1</sup>
- Significant research has been aimed at reducing incidence of toxic shock syndrome that resulted in proven sanitary practices, such as the recommendation to change a tampon every 4-8 hours.<sup>2</sup>
- Reusable menstrual products have become increasingly appealing to consumers due to the cost savings associated with reducing the need to buy single-use products as well as the feel-good notion that comes with reducing waste.<sup>3,4</sup>
- Current sanitation practices for menstrual cups (MC), per the CDC, include cleaning after each use and rinsing then boiling after the conclusion of each menstrual cycle.<sup>2</sup>
- It is unclear if hygiene recommendations for menstrual cups are as efficacious at preventing the incidence of menstrual toxic shock syndrome when compared to that of tampons.

## Significance

- Menstrual products continue to evolve to become more convenient, affordable, and earth friendly, such as in the case of menstrual cups.
- Consumers should feel confident that the safety profile is comparable or better than the previous comparable alternative product (tampons).

## Methods

- A database search was conducted using PubMed, Medline, and Embase to review literature published after 1978.
- Study Selection:
  - Included: studies pertaining to the sanitary measures of menstrual cups, tampons, or both; indiscriminate of location or study design
  - Excluded: Studies focused on extraneous menstrual products, population comparisons, niche populations, funded by product manufacturers
- Outcome measures:
  - Studied comparison of mTSS in tampons vs menstrual cups
  - Recommended vs typical menstrual hygiene practices
  - Hygiene practices in mTSS case studies
  - Manufacturer hygiene recommendations vs studied
- Data analysis: no further analysis was conducted
- Data analysis used in citations: t-test, chi squared, ANOVA

## Methods Cont.

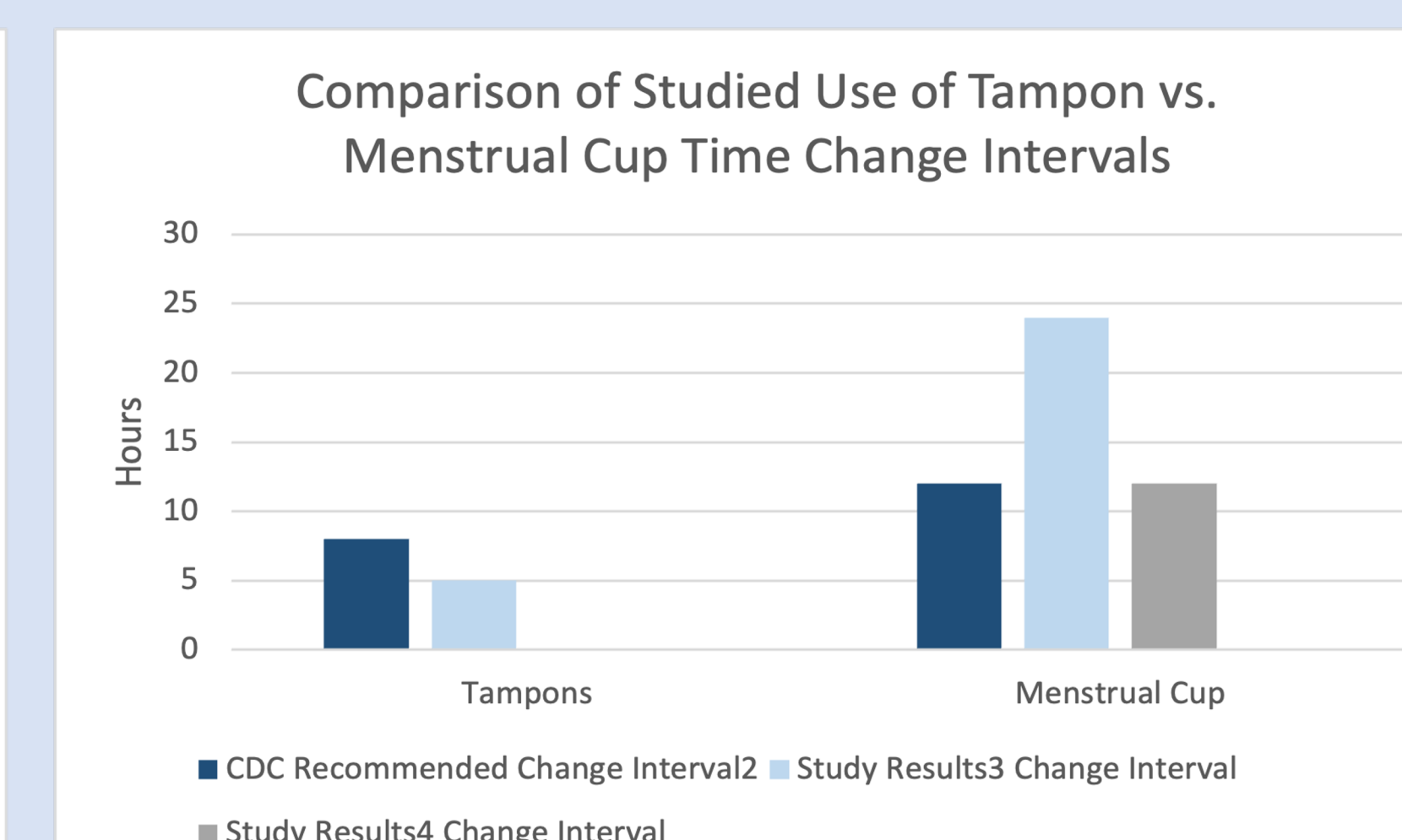
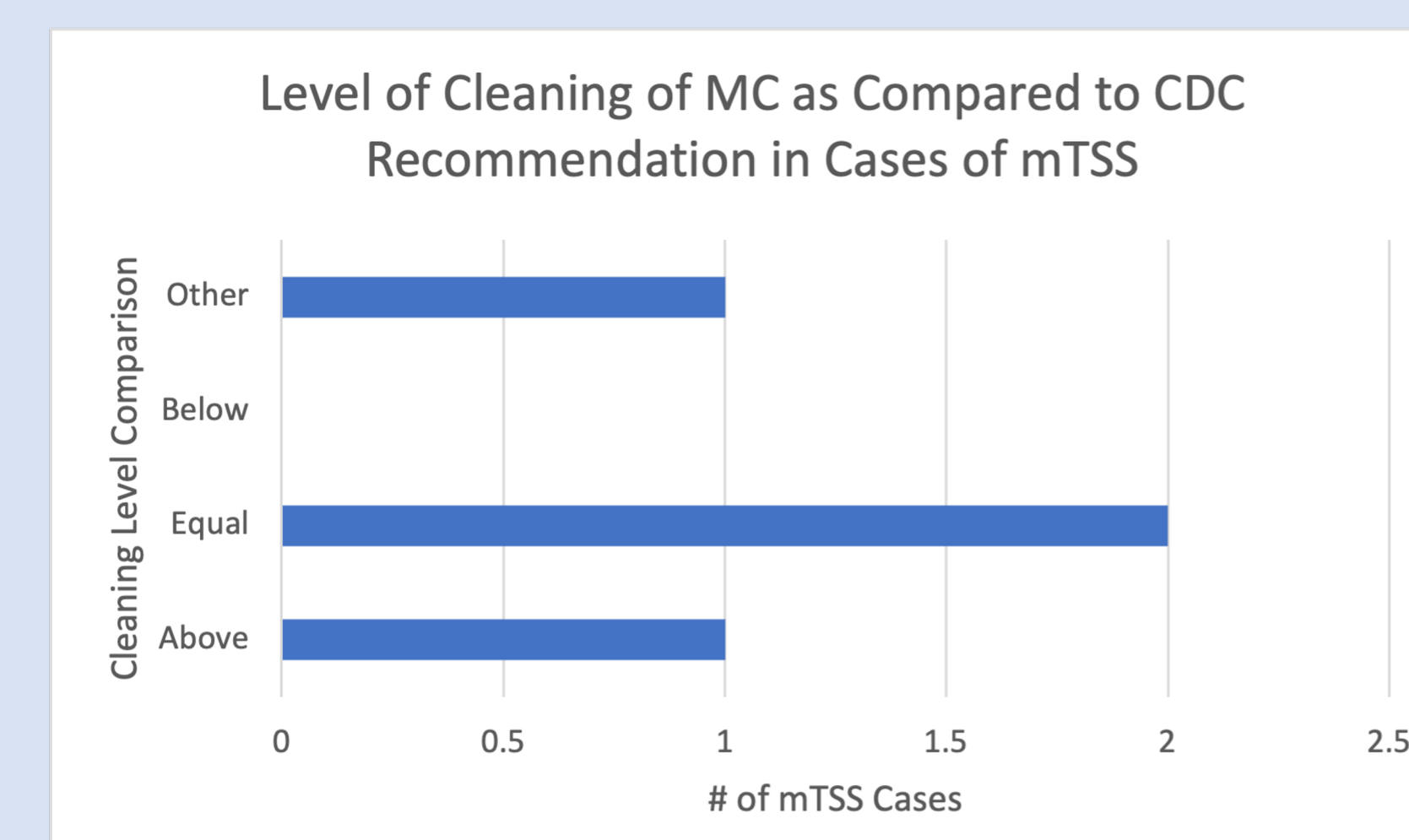
**Table 1. Search Strings and Results**

Database Searched	Date of Search	Key Word Search String	Number of Results
PubMed	9/2/2023	Menstrual cup vaginal infection	148
PubMed	10/2/2023	Menstrual cup sanitation	59
PubMed	10/2/2023	Menstrual cup cleaning	30
MEDLINE (OVID)	10/2/23	Toxic shock syndrome and tampon and menstrual cups	13
Embase	10/2/2023	Toxic shock syndrome and tampons and menstrual cups	13
Embase	10/2/2023	Toxic shock syndrome and menstrual cups	25

## Results

**Table 2. Comparison of Most Popular<sup>5</sup> Menstrual Cup Brands' Hygiene Recommendations vs Recommendations from Study Findings**

Recommended Findings from Studies	Most Popular Menstrual Cup Brands			
	Cora	MeLuna	Lena	Diva
Sanitize Hands Before Insertion	✓	✓		✓
Recommends Smallest Sizing Options				
Changing Frequency Guided by Flow		✓	✓	
Specifies Risk of mTSS		✓	✓	
Emphasizes Reduction of Air on Insertion				
Cleansing with Soap + Water & Boiling After Each Use				



## Results Cont.

- The efficacy of current sanitation recommendations of menstrual cups at preventing mTSS when compared to that of tampons was found to be less effective according to Nonfoux et al. but effective according to Friberg et al.
- The discrepancy is due to the presence of oxygen:
  - Nonfoux et al conducted aerobic treatments based on a modified method previously used by Reiser et al.
    - This correlated positively with TSST growth in comparison to tampons.
  - Friberg et al. conducted anaerobic experiments as a rationale of the recommended form of insertion which evacuates excess air from the vault of the MC.
    - This was found to lack significant growth of S. aureus after cleaning.
- Mitchell et al. & Schilevert, P. corroborate the presence of oxygen in the growth of TSST in tampons.
- The conflict of an anaerobic vs aerobic condition on the growth of TSST should be reduced to the typical use of MCs.
  - Surveys conducted by Parent et al. suggests MCs are not used according to package instructions, suggesting that residual air may be present during MC usage.

## Discussion

- MC hygiene protocols should be updated based on the suggestions presented in the reviewed literature in order to further prevent incidence of mTSS:
  - Use smallest appropriately sized cup
  - Frequency of change should be based on menstrual flow
  - Wash with soap & water, then boil to sanitize between each use
  - A second rotational cup should be available between cleanings
  - Wash hands before inserting MC
  - Insertion instructions should emphasize reduction of air
  - Manufacturers must emphasize the risk of mTSS with MC use
- Popular MC brands fall short of these recommendations most frequently in sizing, insertional instruction, and cleansing.
  - Sizing was advertised to be guided by gravity, age, and vaginal canal depth
  - All brands recommend cleaning with soap & water after each use and boiling only after the conclusion of each cycle. None mention a second rotational cup for use between cleanings.
  - Brands that did not meet frequency of changing was due to guidance via time interval rather than menstrual flow

## Future Direction

- The CDC guidelines lack clear guidance on hygiene measures for menstrual cups and need to be updated with specific information gleaned from research. Further studies should continue to examine the relationship between MCs, tampons, and mTSS.