


## RESEARCH ARTICLE

## General gynaecology

# Patient preferences for disposable and reusable vaginal specula and their willingness to compromise in the era of climate change: A cross-sectional study

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## Abstract

**Objective:** To evaluate patient satisfaction on gynaecological examination with metal, plastic and biobased plastic vaginal specula, and to investigate whether patients are willing to compromise on comfort for a more sustainable healthcare system.

**Design:** Cross-sectional study: population-based survey.

**Setting:** Gynaecological outpatient clinics in five Dutch hospitals.

**Population:** Patients during general gynaecology consultation hours.

**Methods:** A survey containing two questions about patient demographics, four about comfort and five about sustainability and healthcare was distributed.

**Main outcome measures:** Comfort score (scale 1–10). Secondary outcomes: (1) temperature, size and ease of insertion, (2) willingness to compromise for a more sustainable healthcare system.

**Results:** In all, 196 patients completed the survey. Biobased plastic vaginal specula scored significantly higher on comfort than the metal ones (mean  $8.03 \pm 1.65$  versus  $7.26 \pm 1.51$  respectively;  $P < 0.001$ ). The biobased plastic vaginal speculum is significantly the most comfortable on temperature, whereas the metal speculum is the least comfortable ( $P < 0.007$ ). Most patients are willing to compromise on comfort or are open to the reuse of disposables to contribute to a more sustainable healthcare. The majority of patients (77%) urge healthcare organisations to combat climate change.

**Conclusions:** There is a small but statistically significant difference in favour of a biobased plastic speculum regarding comfort score, although it might be questioned whether this is clinically relevant. Furthermore, patients are willing to compromise on comfort for a more sustainable healthcare, which should be a contributing factor in speculum selection.

## KEY WORDS

climate change, disposable, healthcare sustainability, patient preference, reusable, vaginal speculum, waste

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## 1 | INTRODUCTION

In September 2021, more than 200 medical journals worldwide called on world leaders to take more and faster action against climate change.<sup>1,2</sup> The WHO emphasises that the climate crisis is the single biggest health threat facing humanity.<sup>3</sup> To achieve sustainability goals, healthcare systems can adopt various measures, such as transitioning to circular practices and reusing instruments to limit the scarcity of raw materials and waste generation. In a circular economy, products and materials are kept in circulation through processes such as maintenance, reuse, refurbishment, remanufacture, recycling and composting.

However, an alarming trend has emerged in recent years, as hospitals have increasingly relied on disposable instruments such as plastic specula, which are incinerated after a single use, contributing to waste and environmental impact. To make informed decisions regarding speculum selection, the University Medical Centre Utrecht conducted a quality improvement project to analyse various aspects of the vaginal speculum.

In addition to evaluating patient satisfaction and willingness to compromise on comfort, the project conducted a life cycle assessment (LCA) to compare the reusable (metal) and disposable specula (plastic and biobased plastic based on sugar cane). The LCA revealed that the single-use speculum made of biobased plastic and the reusable metal speculum both have a lower climate impact than the single-use speculum made of fossil plastic.<sup>4</sup>

To our knowledge, no data are available on satisfaction per speculum type, but in general, most patients consider pelvic examination to be unpleasant.<sup>5</sup> Therefore, it is of utmost importance that a speculum is as comfortable as possible, so that the barrier to going to the general practitioner or gynaecologist with physical complaints or responding to the invitation for population screening on cervical cancer is as low as possible.

Three types of specula were compared for this research on patient satisfaction: the reusable metal speculum and the single-use plastic and biobased plastic specula.

## 2 | METHODS

### 2.1 | Study design

A cross-sectional study was performed in five hospitals in the Netherlands between October and December 2021. Two gynaecologists (in training) participated in each hospital. Patients were included during general gynaecology consultation hours. Exclusion criteria include an indication for a virgo speculum, patients with complaints of pelvic floor hypertonia or vaginismus, and those requesting a plastic speculum in advance. The intention was that each gynaecologist (in training) would examine 10 patients with a metal speculum (M), then 10 patients with a plastic (P) and then 10 patients with a biobased plastic (B) speculum, not

necessarily in that order. To avoid selection bias, the respective gynaecologist (in training) continued to use the same speculum type until there were 10 inclusions, after which he/she moved on to the next type. On the survey, the gynaecologist noted the speculum used as M, P or B. After the gynaecological examination, patients were informed about this patient satisfaction survey and were invited to participate. Upon approval, the survey was handed over and filled in anonymously. The disposable specula are produced by Bridea Medical®. The type of metal speculum differed and was chosen by the gynaecologist concerned.

### 2.2 | Survey

The survey consisted of 11 questions: two about demographic characteristics of the patient, four about comfort and five about sustainability and healthcare. To assess comfort comprehensively, four questions were developed, including the general comfort score (visual analogue scale 1–10), along with specific inquiries about temperature, size and ease of insertion. The overall comfort score question was scored from 1 to 10 on a continuous scale; 1 being very uncomfortable and 10 very comfortable. The specifying comfort questions were scored as categorical variables in a multiple-choice question; too cold/pleasant/too warm, too large/appropriate and difficult, rough/easy, smooth. To reflect how patients contemplate sustainability and healthcare, four statements were added, which could be answered with 'strongly disagree', 'disagree', 'no opinion', 'agree' or 'strongly agree'. Finally, patients were asked to rank what they found the most important point for improvement in healthcare: more comfortable examination, more affordable healthcare, or reduction in waste production.

### 2.3 | Sample size

The primary outcome of the study was comfort on a scale of 1–10. Our hypothesis was that a plastic and biobased plastic speculum are more comfortable than a metal speculum. A difference of >1 point on the 10-point scale was considered clinically relevant by the study group.

Because there are no clinical reports on this topic, we used the first 30 surveys on examination with the metal speculum to determine the mean and standard deviation. These data were used to calculate the sample size. Based on a mean of 7.38 with a standard deviation of 2, a total of 177 participants needed to be included to detect a difference on comfort of >1 point, i.e. 59 patients per speculum type. The SAS-system was used for this calculation.

### 2.4 | Statistical analyses

The printed survey forms were collected and the data have been manually put in IBM SPSS 26.0.

Descriptive statistics are presented for all variables. The 10-point comfort scale is reported as mean with standard deviation (SD). For categorical variables the frequency and proportion are described. The chi-square test was used to determine statistical significance between groups for categorical parameters and the Kruskal–Wallis and Mann–Whitney *U*-test for the comfort score. The differences were considered to be statistically significant when  $P \leq 0.05$ .

### 3 | RESULTS

In all, 196 surveys were collected during the study period: 61 metal, 67 plastic and 68 biobased plastic. Table 1 shows the baseline and clinical characteristics of the patients per speculum type. There are no differences between the three groups in terms of age or number of previous speculum examinations.

As shown in Table 2, patients who underwent an examination with a biobased plastic speculum gave it the highest comfort score: an average of  $8.03 \pm 1.65$ , versus  $7.26 \pm 1.51$  for the metal speculum and  $7.69 \pm 1.67$  for the plastic speculum ( $P < 0.006$ ). The post hoc tests showed a significant difference in comfort between patients who underwent a vaginal examination with a metal vaginal speculum versus a biobased plastic speculum ( $P < 0.001$ ). A linear regression analysis showed that age and previous speculum examination had no influence on the differences in comfort score. The results of the other comfort questions are also shown in Table 2. The only statistically significant difference regarding temperature was between the metal and biobased plastic speculum ( $P < 0.007$ ), where the temperature of the biobased plastic speculum was perceived as the most pleasant and the metal speculum as the least pleasant. There is no statistically significant difference in size or ease of insertion between any of the specula.

All 196 patients filled in statement C, there was one missing for statements A, B and D. A total of 123 patients (63%) were willing to compromise on comfort if a certain

TABLE 1 Participant characteristics.

| Characteristics                | Metal (n=61) | Plastic (n=67) | Biobased plastic (n=68) |
|--------------------------------|--------------|----------------|-------------------------|
| Age                            |              |                |                         |
| <30 years                      | 10 (16.4%)   | 6 (9%)         | 13 (19.1%)              |
| 30–50 years                    | 21 (34.4%)   | 32 (47.8%)     | 33 (48.5%)              |
| 50–70 years                    | 24 (39.3%)   | 21 (31.3%)     | 18 (26.5%)              |
| >70 years                      | 5 (8.2%)     | 5 (7.5%)       | 3 (4.4%)                |
| Missing                        | 1            | 3              | 1                       |
| Previous speculum examinations |              |                |                         |
| 0 times                        | 2 (3.3%)     | 2 (3%)         | 5 (7.4%)                |
| 1–5 times                      | 22 (36.1%)   | 25 (37.4%)     | 22 (32.4%)              |
| >5 times                       | 30 (49.2%)   | 29 (43.3%)     | 32 (47.1%)              |
| Missing                        | 7            | 11             | 9                       |

type of speculum was a more durable alternative, whereas 44 patients (23%) disagreed on this. In all, 118 patients (61%) were open to the reuse of devices originally intended for single use, whereas 54 patients (28%) were not. A total of 169 patients (86%) try to reduce their impact on the environment in their personal lives, whereas four patients (2%) do not. In addition, 150 patients (77%) think it is important that healthcare plays a greater role in combating climate change, whereas six patients (3%) disagree with this (Figure 1).

Figure 2 generates a representation of what is considered the most important improvement point for healthcare and what is not. Although this question was designed as a prioritising question, it was not completed as such by all patients. It was therefore decided to present the answers as a valid percentage, a percentage when the missing data are excluded from the calculation; 99 of the 195 patients (53.2%) prioritised comfortable examination as the most important point for improvement in healthcare. Reduction in waste production was considered least important by 60 patients (48.8%).

### 4 | DISCUSSION

#### 4.1 | Main findings

Our results show that there is a small but statistically significant difference in comfort score between biobased plastic and metal vaginal specula; the single-use speculum from fossil

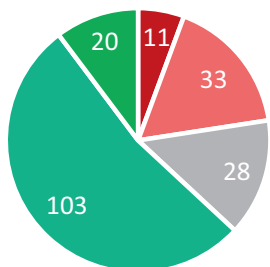
TABLE 2 Results for patient satisfaction with different types of vaginal specula.

|                   | Metal (n=61)      | Plastic (n=67)    | Biobased plastic (n=68) |
|-------------------|-------------------|-------------------|-------------------------|
| Comfort           |                   |                   |                         |
| Mean comfort      | $7.26 \pm 1.51^*$ | $7.69 \pm 1.67^*$ | $8.03 \pm 1.65^*$       |
| Score <6          | 8 (14%)           | 4 (6.25%)         | 6 (9%)                  |
| Missing           | 4                 | 3                 | 2                       |
| Temperature       |                   |                   |                         |
| Too cold          | 8 (13.1%)         | 4 (6%)            | 1 (1.5%)                |
| Pleasant          | 50 (82%)          | 61 (91%)          | 67 (98.5%)              |
| Too warm          | 0 (0%)            | 0 (0%)            | 0 (0%)                  |
| Missing           | 3                 | 2                 | 0                       |
| Size              |                   |                   |                         |
| Too large         | 2 (3.3%)          | 3 (4.5%)          | 2 (2.9%)                |
| Appropriate       | 57 (93.4%)        | 63 (94%)          | 66 (97.1%)              |
| Missing           | 2                 | 1                 | 0                       |
| Ease of insertion |                   |                   |                         |
| Difficult, rough  | 4 (6.6%)          | 3 (4.5%)          | 0 (0%)                  |
| Easy, smooth      | 57 (93.4%)        | 63 (94%)          | 67 (98.5%)              |
| Missing           | 0                 | 1                 | 1                       |

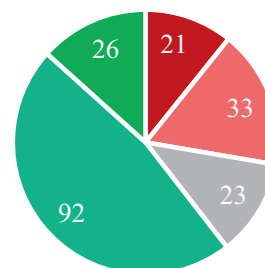
Note: Data are expressed as mean  $\pm$  SD or *n* (%).

\**P*-value: metal versus plastic <0.111; metal versus biobased plastic <0.001; plastic versus biobased plastic <0.118.

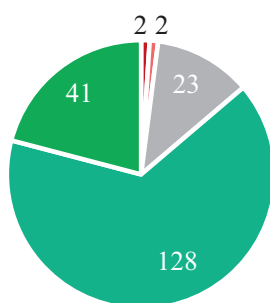
**(A)** I am willing to compromise on comfort if a certain type of speculum is a more durable alternative.



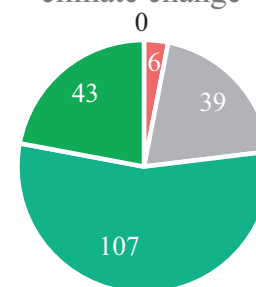
**(B)** I am open to the reuse of devices originally intended for single use.



**(C)** In my personal life I try to reduce my impact on the environment

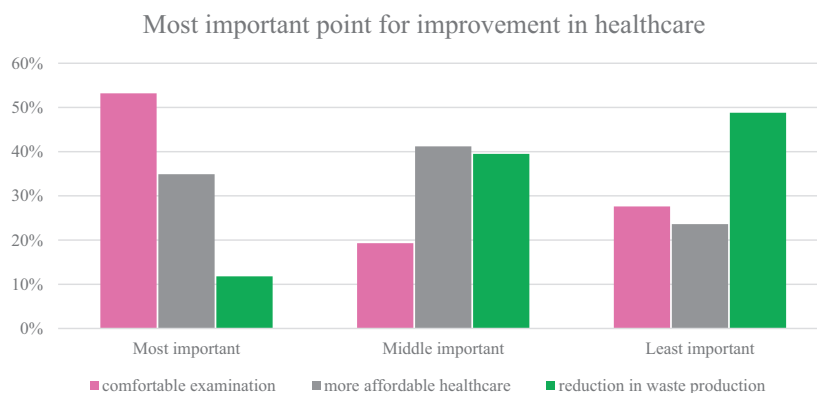


**(D)** I think it is important that healthcare plays a greater role in combating climate change



■ strongly disagree ■ disagree ■ no opinion ■ agree ■ strongly agree

**FIGURE 1** Statements on sustainability and healthcare.



**FIGURE 2** Patients' opinions on points for improvement.

plastic scored in between. However, since a difference of more than one point was considered clinically relevant, we conclude that there is no difference in comfort among the three types of specula. Regarding the results for a greener healthcare, most patients are willing to compromise on comfort to contribute to a more sustainable healthcare and the majority of patients urge healthcare organizations to combat climate change.

### 4.2 | Interpretation

The difference in comfort between the different types of specula is <1 point, which was previously considered not clinically relevant by the research group. We cannot explain why there would be a difference between the disposable specula made of fossil plastic or biobased plastic, as

there seems to be no objectifiable difference between these two types of specula. Besides, it is striking that the comfort scores for all speculum types are surprisingly high for an examination that is considered uncomfortable.<sup>5-7</sup> Less than 15% of the patients rated the speculum used as unsatisfactory (<6) on the comfort scale. Although we did not ask patients why they gave a low score, this could be due to the fact that the metal speculum was significantly more often experienced as cold. Regarding this point, there is probably still room for improvement, as in three of the five participating hospitals a warming cabinet is no longer in use since the introduction of the plastic speculum. The three types of specula show no statistically significant difference for size or ease of insertion.

Some studies have observed patient experience of speculum examination by means of different kinds of lubrication or sheathed versus standard speculums.<sup>8,9</sup> However, to our knowledge, there is only one article describing a survey of experiences related to vaginal examination with different types of specula among 32 women, recruited via Facebook. Of the 17 women who had experience with both a metal and a plastic speculum, seven (41%) had no preference, seven preferred the plastic speculum and three preferred the metal speculum. Of those who preferred plastic, six answered that coldness of the metal speculum was the reason.<sup>10</sup>

Our study shows that patients are willing to consider reuse of disposable specula. Re-use of medical equipment is a developing area of research in response to growing awareness of the impact of healthcare practices on the environment. In a survey conducted by Ipsos MORI, 85% of the general public in the UK expressed willingness to accept reusable personal equipment in hospital, such as a gown, after it has been sterilised and checked for safety, as a means to help the National Health Services (NHS) reduce emissions and be more environmentally friendly. Furthermore, 58% of respondents supported initiatives connected to reducing waste, by reusing medical equipment (such as blades used for throat surgeries, which are currently single-use) which has been sterilised, even if this meant that they have to use equipment that had been previously used by others.<sup>11</sup> As shown in research done by the National Institute for Health and Care Excellence (NICE), participants believe it can be appropriate for NICE to recommend removing specific care options from the choice set presented to patients for environmental reasons, but only when other effective care options are available. Patient support is strong for sustainability approaches that offer choice, whereas there is division when choice is restricted.<sup>12</sup>

### 4.3 | Strengths and limitations

Our survey is the only study that examines patients' contemplation of sustainability and healthcare in the gynaecology department. Another strength of our study is that it provides a new insight into the comfort of gynaecological

examination, namely by distinguishing by speculum type and by splitting the comfort question into subcategories.

However, there are also limitations to this study. Because this survey was part of a larger project, it was decided to keep the survey as short as possible and opt for a simple structure. This means that data on, for example, ethnicity, socio-economic status, the indication of the gynaecological examination, the parity of the woman, sexual activity, menopausal status (with or without hormone replacement therapy) and the exact type and size of the metal speculum are missing. This may have caused bias. However, an additional linear regression analysis showed that age and previous vaginal examination had no influence on the results. In addition, patient input was not actively requested for the formulation of the survey and it was not discussed with them what they would consider a clinically relevant difference. The survey has also not been validated. Another issue was that many outpatient appointments have been cancelled due to the COVID-19 pandemic, so not all gynaecologists (in training) have been able to conduct 10 surveys per speculum type. However, each gynaecologist conducted a comparable number of surveys per type of speculum, so that no bias occurred due to differences in experience of the gynaecologist. However, gynaecologists may have conducted the examination or prepared the patients differently when using a metal or (biobased) plastic speculum, potentially causing bias. For instance, they may have warned the patient about potential discomfort or coldness. In general, patients were willing to complete the survey. There have been some patients who were not asked to complete the survey, namely when a virgo speculum was indicated, when patients had complaints of pelvic floor hypertonia or vaginismus or because they requested a plastic speculum in advance. Because we did not register these patients, this may have caused selection bias in the study population. The surveys were conducted during general gynaecology consultation hours, which means that the results may not be generalisable for primary care practice on the one hand and specialist gynaecology consultations on the other hand. Lastly, we could not include non-Dutch speaking patients, as there was no English version of our survey. We realise that this is a rather small study and therefore we would endorse studies in diverse populations, where researchers can take our limitations into account.

## 5 | CONCLUSION

In this study, the biobased plastic speculum had the highest comfort score, but the differences in comfort between the metal, plastic and biobased plastic speculum were small and probably not clinically relevant. The study also found that patients are willing to compromise on certain aspects of vaginal examination for a more sustainable healthcare system. Together with the results of the life cycle analysis<sup>4</sup> and taking the cost aspect into account, a well-considered choice of a certain type of speculum can be made in consultation with patients, whereby in the current era everything must be done to combat climate



change. Therefore sustainability should be an important factor in decision-making.

### AUTHOR CONTRIBUTIONS

All authors met criteria A, B, C and D. AAATB, TBP, AK: conception, planning, analysing, writing and revision of the draft. MYB, LMB, NVH, WMK, AT: conception, acquisition, revision of the draft. NPAZ: analysing, revising article.

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### CONFLICT OF INTEREST STATEMENT

The authors declare that there is no (financial) conflict of interest relevant to this article.

### DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

### ETHICS APPROVAL

This survey is part of a larger quality improvement project. The science office of the Gynaecology Department at the University Medical Centre Utrecht advised that because no additional medical procedures were performed, no review by the Medical Research Ethics Committee (MREC) was necessary. In addition, no written informed consent was needed. Participation in the survey was of course voluntary.

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