

Assessing women's preferences in a novel intrauterine device designed to monitor the womb environment in real time: A discrete choice experiment

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BACKGROUND

The intrauterine environment is essential for successful implantation and placentation. The University of Southampton, in conjunction with an industry partner, are developing an intrauterine device with the potential to monitor the **temperature, pH and dissolved oxygen in real time in the uterus**, with the aim of supporting those with reproductive failures. Current treatment for women with reproductive disorders remains suboptimal and there is no ability to triage patients into appropriate disease/treatment groups. Up to 20% of couples with infertility and 50% of women with recurrent miscarriages have no identified cause for the reproductive problem and as such are then offered either blanket IVF treatment or supportive care.

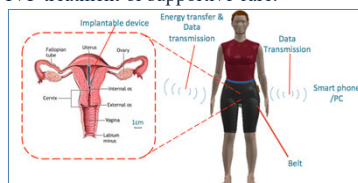


Figure 1 Pictorial representation of the novel intrauterine device and how it sits within the uterus. The sensor is batteryless and is powered using a belt and a mobile phone/PC. A belt worn around the waist delivers energy to the sensor and collects data when required. A smartphone/PC collects the data.

The device (Figure 1) is similar in shape and size to a contraceptive coil, and has an accompanying wearable garment with an information receiver to collect data. This study aims to explore factors that are of importance to potential users of the intrauterine device using a discrete choice experiment (DCE).

DCE STUDY DESIGN

DCE is a **preference elicitation method** whereby individuals reveal their preference over selected attributes of a product in a series of pair-wise choices of hypothetical alternative products. Choice sets consisted of two hypothetical intrauterine devices described via four attributes: length of use, information obtained and its use in guiding treatment, risk of complications and discreteness of the information receiver.

METHOD

- Women of **reproductive age (18-50 years)**, who were wishing to achieve a pregnancy now or sometime in the future were recruited into the DCE study at Princess Anne Hospital in Southampton.
- A **fractional factorial design** was used to estimate effects of the four attributes, using 18 pair wise choice sets that identified all main effects and selected two-way interactions, blocked into two blocks of 9 choice sets each.
- **Conditional and mixed logit models** were used to analyse responses.
- Ethical approvals were obtained (ERGO 49115, REC 19/IEC08/0036).

EXAMPLE QUESTION

Consider the devices described by the following two sets of features (Device A and Device B). Please indicate which choice you would prefer by circling the column.

	Device A	Device B
Length of time using the device	7 Days	28 Days
Information obtained from the device and its use in guiding treatment	The information obtained will guide treatment in all cases	The information obtained will guide treatment in all cases
Risk of complications	10%	1%
Discreteness of the information receiver	Moderately discrete	Completely discrete

LIMITATIONS

Women were recruited from a single UK teaching hospital and limit the its external applicability. Hypothetical bias may lower external validity. Participants are evaluating the hypothetical choice sets intended to simulate real-life decisions, but the responses may not accurately reflect real choices.

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RESULTS

➤ 361 women participated in this study. Women prefer a device which stays in the uterus for the **shortest length of time**, provides information that **guides treatment in all cases**, has the **lowest risk of complications**, and has an information receiver which is **completely discrete**. All preferences were statistically significant ($p < 0.05$).

➤ Women placed most importance on the information gained from the device and its ability to guide treatment. Respondents were over 2 times more likely to choose a device if the **information obtained guided treatment in all cases** (co-efficient 2.771), compared to when information obtained guided treatment in the majority of cases (co-efficient 1.243).

➤ Obtaining information that guided treatment in all cases (co-efficient 2.771) had an equal importance to a drop in risk of complications by 15% (co-efficient 0.184 per 1% decrease).

➤ Completely discrete devices (co-efficient 1.104) were over 1.5 times more attractive than moderately discrete devices (co-efficient 0.793).

➤ Women put same level of importance on 12 days decrease in the length of use of the device (co-efficient 0.015 per 1 day decrease) as a 1% decrease in the risk of complications (co-efficient 0.184 per 1% decrease).

CONCLUSIONS

All four selected attributes played a significant role in altering women's preference for a novel device designed to monitor the intra-uterine environment.

Women seemed to place the **most importance on having a device that obtains information to guide treatment** and are willing to use the device for longer, have a device with higher risk of complications and an indiscrete device it were able to provide answers and direction for treatment of their reproductive disorder.