

The development of a multi-criteria decision analysis aid to help with contraceptive choices: My Contraception Tool

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ABSTRACT

My Contraception Tool (MCT) applies the principles of multi-criteria decision analysis to the choice of contraceptive method. Its purpose is to make the decision-making process transparent to the user and to suggest a method to them based on their own preferences. The contraceptive option that emerges as optimal from the analysis takes account of the probability of a range of outcomes and the relative weight ascribed to them by the user. The development of MCT was a collaborative project between London School of Hygiene & Tropical Medicine, Brook, FPA and Maldaba Ltd. MCT is available online via the Brook and FPA websites. In this article we describe MCT's development and how it works. Further work is needed to assess the impact it has on decision quality and contraceptive behaviour.

RATIONALE

Despite major advances in availability and use of contraception over the past half century, unintended pregnancy remains a public health concern. It is likely that a large proportion of unintended pregnancies are attributable to inconsistent use of contraception and the discontinuation of contraception and/or change of method.^{1 2} The consequences of 'poor' contraceptive decisions for the individual can be long-lasting and can have negative social and health consequences, while at a societal level they have service-related and cost implications. Provision of better support at the time of contraceptive decision-making could improve uptake and consistency of method use.

Decision aids are increasingly used in health care decision-making. They take a number of formats and approaches, but all provide a structured framework within which options may be systematically

Key message points

- ▶ Decision aids have the potential to help people make more effective contraceptive decisions as they take account of individual user preferences.
- ▶ My Contraceptive Tool is a decision aid designed with lay and professional consultation and accessible via the Brook and FPA websites.
- ▶ Contraceptive decision aids have been shown to be acceptable to users, but evidence of their impact on decision quality and contraceptive uptake and continuation is needed.

analysed and selected, taking account of their possible outcomes in relation to individual needs and values.^{3 4} Where standard health education provides information on which to base a decision, decision aids go further, identifying the risks and benefits and encouraging consideration of values associated with each. A systematic review of health treatment or screening decision aids found that they improved knowledge amongst users and communication between patient and providers.⁵

Decision aids might be particularly suitable tools to help people with contraceptive decision-making.⁶ Most people, at some stage in life, are faced with decisions around fertility control and sexually transmitted infection (STI) prevention. Men and women seeking contraception are not ill, so that a personal and social approach to health care is likely to be more appropriate than one with a more biomedical focus. Since the contraceptive

repertoire is broad, and choice of method needs to take account of a range of factors, the thorough consultation needed to make a choice is likely to take longer than the time normally available in the clinical consultation.

In this article we describe the development of My Contraception Tool (MCT). This work was done in conjunction with Brook, FPA and Maldaba Ltd. MCT can be accessed on the Brook and FPA websites. The purpose of this aid is to make the decision-making process transparent to the user and to suggest a method to them based on their own preferences.

THEORETICAL FRAMEWORK

Normative decision theory assumes that the decision maker has all the information required to make a decision, including knowledge of all the alternative options, and is aware of their preferences with regard to each of these options.³ It forms the basis of subjective expected utility theory and its prescriptive implementation in decision analysis.⁷

Individuals rarely choose a contraceptive method by systematically weighing up its pros and cons. Using the Health Belief Model and the Theory of Planned Behaviour as frameworks, predictors for decisions around contraceptive use include: (1) consideration of the costs and benefits of contraceptive behaviour; (2) assessment of the risks, such as unplanned pregnancy or STI acquisition; (3) perceived norms towards contraceptive use and sexual health outcomes held by significant others (including sexual partners, friends and family); (4) willingness to conform to wishes of significant others; and (5) self-efficacy around contraceptive use, such as confidence in accessing health services to obtain contraceptive supplies.⁸

MCT applies to the choice of contraceptive method the principles of multi-criteria decision analysis (MCDA), a method of breaking down complex problems or questions into manageable components, and combining them to rate the various options and produce an opinion as to the best course of action. The contraceptive option that emerges as optimal from the analysis takes account of the probability of a range of outcomes (e.g. the probability of pregnancy for different contraceptive options) and the relative weight ascribed to them (e.g. how important it is to the user to avoid pregnancy).

HOW MCT WORKS

MCT is built using two pieces of proprietary software, Annalisa[®] and Elicia[®].^{9 10} Annalisa is a multi-criteria decision aid with a single screen interface that allows the user to create and explore decision-making scenarios. Elicia is a general purpose web-based questionnaire builder. Annalisa is embedded within Elicia, which allows the decision-making process to be customised and personalised according to questionnaire responses. Annalisa uses a direct weighting method,

which is simpler and less time-consuming to use than other multi-criteria methods, such as the analytic hierarchy process.⁴

MCT is designed for use by men and women of any age who want to use contraception or to find out about different contraceptive options. In addition to the avoidance of pregnancy and STIs, users are asked to identify 'acceptability-related' contraceptive attributes that are important to them, ranging from different side effects (such as changes in menstrual bleeding patterns or weight gain) to other concerns (such as having to go to a clinic to obtain supplies or having to remember when to use or take a method). They are then required to indicate the extent to which they wish to avoid pregnancy, STIs and the acceptability-related attributes according to their personal preferences, circumstances and values. Weights are assigned through simple manipulation of a cursor on a single graphic screen that presents all the elements of a decision. MCT combines these user-ascribed weights (w) with the best available evidence on the performance of the different contraceptive methods (p) to produce a personalised rating and ranking of the contraceptive methods for each user thus: $[w_1 \times p_1] + [w_2 \times p_2] + [w_3 \times p_3] \dots = \text{SCORE}$.

DEVELOPMENT OF MCT

The tool has been developed so that it can be used online at home or any other venue with computer access that suits the user. Health care workers can also use MCT with clients. MCT was developed through a partnership between academics, the voluntary sector, and software and web designers. Input from consumers was sought throughout the process. Development involved four broad stages:

- 1 Establishment of user panel groups
- 2 Development of the questionnaire
- 3 Collection of scientific data used in the underlying decision analysis within Annalisa
- 4 Online piloting of the contraceptive decision aid.

User panel groups

The aims of these groups were to identify contraceptive attributes important to the decision-making process, building on an initial literature review, and to obtain input on language and definitions to be used in the aid. Three face-to-face groups were conducted and 20 people in total participated (15 women and 5 men), recruited through Brook and FPA networks. Thirty contraceptive attributes, in addition to avoidance of pregnancy and STIs, were identified. These fell into three broad categories: negative side effects, benefits and 'bother' factors (Table 1). Short-term acceptability-related factors that affect decision-making were privileged over longer-term costs and benefits, such as increased risk of thrombosis and decreased risk of endometrial and ovarian cancers amongst combined oral contraceptive (COC) pill users

Table 1 Short-term acceptability-related attributes identified as important to contraceptive decision-making

Benefits	Side effects	Other factors affecting satisfaction
Less heavy periods	Heavier periods	Having to see a doctor or nurse to get contraception
No periods	No periods	Having to go to a shop/pharmacy to get contraception
Less painful periods	Painful periods	Having an injection
More regular periods	Irregular bleeding or spotting	Having an implant under the skin in one's arm
Less premenstrual symptoms	Nausea	Having a vaginal examination at a clinic
Less acne	Weight gain (>2 kg)	Remembering when to take or use contraception
	Irritability/depression	Relying on my partner to remember when to take or use contraception
	Breast tenderness	Genital contact (touching the vagina or penis) to use contraception
	Headaches	Any interruption during sex in order to use a contraceptive method
	Skin irritation	Any loss of sensation/feeling during sex
	Loss of sex drive	Sexual partner knowing of contraceptive use
	Delay in return to fertility	Friends or family knowing of contraceptive use

for two reasons. First, the risk of these events attributable to contraceptive use is small and so would be unlikely to affect MCT's recommendation even if the user places a large proportion of weight on one of these outcomes. Second, and more pragmatically, if all possible adverse events are included the list of attributes would be extensive. Information about long-term effects associated with contraceptive use is available on the Brook and FPA websites. In addition, a section on 'Frequently Asked Questions' to explain how the tool works and to address any user queries was added.

Once the tool was developed, wider feedback from members of the user panel groups was obtained online, with users testing the aid and sending through their comments (see Online piloting and testing).

Questionnaire

Personal criteria are obtained through the completion of the online questionnaire, which is part of MCT and uses the Elicia software. The questionnaire's purpose is to ensure:

- 1 Customisation for each user through *survey modifiers*, for example, different questions are asked depending on gender;
- 2 Personalisation through *topic modifiers* so that (i) individuals are linked in the underlying decision analysis framework to evidence that most fits their current circumstances, for example, ensuring that data are age-specific where relevant; and (ii) contraceptive options can be filtered out depending on the user's responses, for example, responses to medical history questions may suggest that specific contraceptive methods are contraindicated; and
- 3 Relevant information is collected for *research* purposes.

Data from the questionnaire can be used, with the user's consent, for monitoring and evaluation purposes. The question topics were developed from literature review and from discussions during the user panel groups. Where appropriate, validated questions were used, for example from the National Survey of

Sexual Attitudes and Lifestyles (Natsal 2000). Topics included: socio-demographic characteristics (e.g. age, gender and geographical region), sexual behaviour (e.g. partnership status, number of sexual partners in the last year), contraceptive and reproductive history (e.g. contraceptive method ever and currently used, parity), medical history to identify contraindications to specific contraceptive methods (e.g. whether or not a smoker, use of medication), identification of acceptability-related attributes of contraceptive methods that most affect decision-making (Table 1), and whether users are surprised by the contraceptive method suggested and whether they are likely to use it. Users can indicate whether they want to complete the short questionnaire, which takes around 5 minutes to complete, or the longer questionnaire, which takes around 15 minutes to complete. The longer version includes questions on contraceptive and reproductive history and medical history, and is recommended for women aged 35 years and above.

Collection of evidence

In the main, best available evidence for the underlying decision analysis for each of the 15 contraceptive options included in MCT was obtained from Faculty of Sexual & Reproductive Healthcare guidelines and relevant Cochrane reviews (full details on the evidence base used in MCT is available on request from the authors). Where possible, data relevant to the UK population was used. The probability of an outcome happening at 1 year follow-up, again where possible, was collected, such as the chance of pregnancy within 1 year. Behavioural data that might affect STI risk, such as number of sexual partners and prevalence of STI acquisition by age and gender (chlamydial infection was used as a proxy measure), was obtained from Natsal 2000.¹¹ Definitions were provided where appropriate (e.g. no periods or amenorrhoea was defined as no bleeding for more than 90 days). Where there was no evidence available, clinical guidance was sought to provide the estimates. The evidence used in

the underlying decision analysis framework was reviewed by a clinical advisor at FPA. UK Medical Eligibility Criteria (UKMEC) guidelines were used to identify contraceptive methods that may be contraindicated due to a user's medical history.¹² Methods are removed from the list of contraceptive options if a Category 3 ('theoretical or proven risks outweigh the advantages') or a Category 4 ('unacceptable health risk') condition is reported by the user. For example, COCs are removed if a female user is a smoker and aged 35 years or older. Data for each contraceptive method and attribute were entered into Excel spreadsheets, which were then uploaded into Annalisa. MCT is very much a 'living' aid and can be easily updated as new evidence or guidelines become available.

In relation to 'bother' or inconvenience attributes, users are the experts and are asked to provide their own ratings on how important these attributes are to the decision. For example, if a user indicates that having to remember when to take or use a contraceptive method is an important consideration, they are then asked how difficult would it be for them to remember to take or use a contraceptive method, from 'extremely difficult' (rated as 0.9) to 'slightly difficult' (0.2). These responses are then used in the underlying decision analysis.

Online piloting and testing

User panel members, health care providers and academics working in sexual health, and volunteers from Brook were invited to participate in the online pilot. This process allowed us to test the clarity of instructions and definitions, question validity, and the usability and functioning of the tool (e.g. skips within the questionnaire and question layout). Staff working within Brook and the FPA tested the tool using different case scenarios, for example, how the tool worked when used by young people under the age of 16 years. In March 2010, FPA sent the pilot questionnaire out to their external group of 12 contraception experts for testing. In total, 78 individuals submitted their responses to the pilot questionnaire, together with comments on MCT, which we were able to examine and address, where required, prior to the launch.

MCT ILLUSTRATION

To illustrate how the tool works we have provided two fictitious examples of its use.

Rachael

Rachael is a 38-year-old smoker and neither she nor her husband want any more children. She completes the longer questionnaire. She reports heavy menstrual

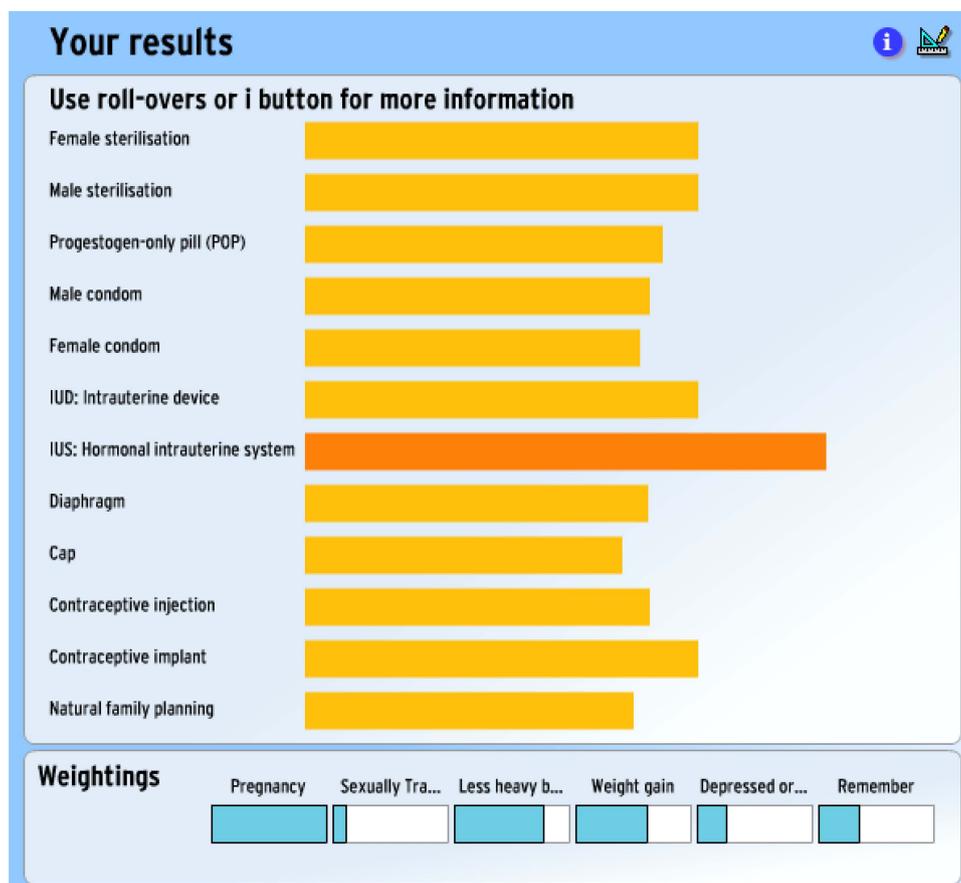


Figure 1 The results screen with Rachael's selected attributes and weightings. NB. The weights entered and shown in these figures do not add up to 1 (i.e. they are non-normalised). In Annalisa[®], weights are normalised so they total 1 and can be used in the underlying calculations to produce the scores for each of the contraceptive options.

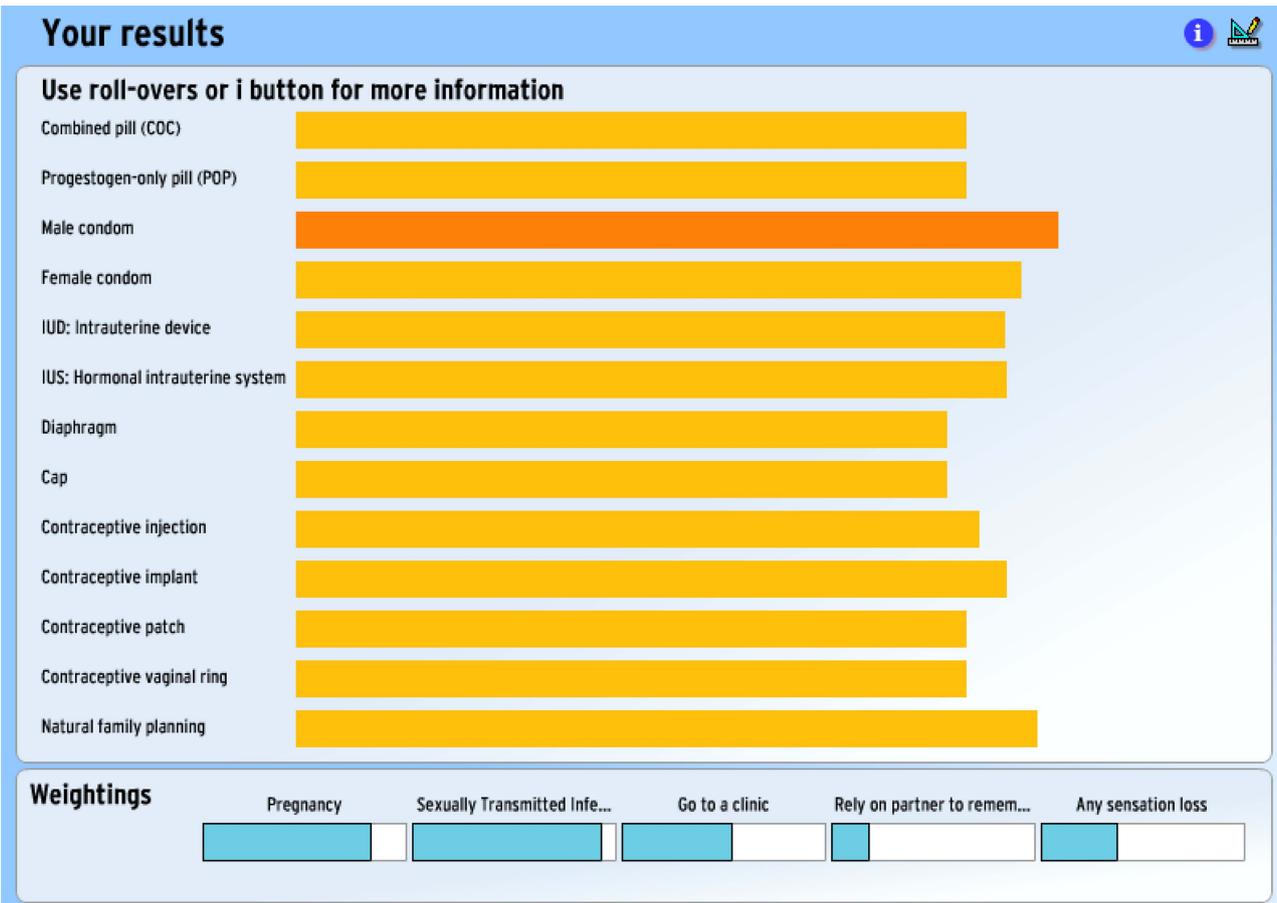


Figure 2 The results screen with Joe’s selected attributes and weightings.

bleeding and she would like a method to help reduce this. The attributes Rachael is most concerned about when choosing a contraceptive method are weight gain of more than 2 kg, irritability or depression, and having to remember when to take or use contraception. She indicates that she finds it fairly difficult remembering when to take or use contraception.

Rachael is then asked to indicate *how much* she is concerned about pregnancy, STIs and her selected attributes by moving the blue bars in the ‘weightings’ section. In Figure 1, it shows that Rachael is most concerned about pregnancy (the longest blue bar), followed by weight gain, having to remember when to take or use contraception, irritability or depression, and finally STIs (the shortest bar). In terms of benefits she places a relatively large weight on having less menstrual bleeding. The top section scores all the appropriate contraceptive methods according to their suitability for each user depending on their responses to the questionnaire. As Rachael is aged over 35 years and is a smoker, the COC pill has been removed from her list of options. The suggested method for Rachael, based on her age, medical background, concerns and desired benefits, is the intrauterine system. This is highlighted by the darkest bar.

Joe

Joe is 18 years old and he has had five sexual partners over the last year. He completes the short questionnaire. The concerns he identifies include having to go to a clinic (which he would find very difficult), relying on his partner to remember to use or take contraception (fairly difficult) and any loss of sensation during sex (fairly difficult). The method suggested to Joe based on his responses and the weight he gives to his selected attributes is the male condom. Male and female sterilisation have been removed from his options because of his age (Figure 2).

Users are encouraged to adjust the length of the blue bars to see how changing the weights that they place on their selected attributes affects the results.

ASSESSING IMPACT

Observational studies have found that decision aids used in contraceptive consultations are acceptable, that clients are more involved in the decision-making process, and there is greater interaction and information-sharing between the client and provider.^{13–16} A benefit of the online MCT is that it might reach those who are not yet accessing sexual health services. Online feedback received from users since its launch has been positive. Between 16

June 2011 and 15 June 2012 there were 37 655 unique hits on MCT on the FPA website and 14 176 on the Brook website. However, the impact these aids have on decision quality, sustained knowledge, contraceptive use and sexual health outcomes is yet to be determined, and our understanding of how user preference affects contraceptive choice requires further systematic investigation.

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REFERENCES

- 1 Bajos N, Lamarche-Vadel A, Gilbert F, *et al.*; COCON Group. Contraception at the time of abortion: high risk time or high risk women? *Hum Reprod* 2006;21:2862–2867.
- 2 Schunmann C, Glasier A. Measuring pregnancy intention and its relationship with contraceptive use among women undergoing therapeutic abortion. *Contraception* 2006;73:520–524.
- 3 Bekker HL, Hewison J, Thornton JG. Understanding why decision aids work: linking process with outcome. *Patient Educ Couns* 2003;50:323–329.
- 4 Dolan JG. Multi-criteria clinical decision support. A primer on the use of multiple-criteria decision-making methods to promote evidence-based, patient-centered healthcare. *Patient* 2010;3:229–248.
- 5 Stacey D, Bennett CL, Barry MJ, *et al.* Decision aids for people facing health treatment or screening decisions. *Cochrane Database Syst Rev* 2011;10:CD001431.
- 6 French RS, Wellings K, Cowan FM. How we can help people to choose a method of contraception? The case for contraception decision aids. *J Fam Plann Reprod Health Care* 2009;35:219–220.
- 7 Edwards W. The theory of decision making. *Psychol Bull* 1954;51:380–411.
- 8 Gage AJ. Sexual activity and contraceptive use: the components of the decision making process. *Stud Fam Plann* 1998;29:154–166.
- 9 Annalisa[®]. <http://www.annalisa.org.uk> [accessed 16 May 2013].
- 10 Elicia[®]. <http://www.maldaba.co.uk/products/elicia/> [accessed 16 May 2013].
- 11 Fenton KA, Korovessis C, Johnson AM, *et al.* Sexual behaviour in Britain: reported sexually transmitted infections and present genital *Chlamydia trachomatis* infection. *Lancet* 2001;358:1851–1854.
- 12 Faculty of Sexual & Reproductive Healthcare. *UK Medical Eligibility Criteria for Contraceptive Use*. 2009. <http://www.fsrh.org/pdfs/UKMEC2009.pdf> [accessed 16 May 2013].
- 13 Chin-Quee DS, Jaonwitz B, Otterness C. Counseling tools alone do not improve method of continuation: further evidence from the decision-making tool for family planning clients and providers in Nicaragua. *Contraception* 2007;76:377–382.
- 14 Kim YM, Kols A, Martin A, *et al.* Promoting informed choice: evaluation a decision-making tool for family planning clients and providers in Mexico. *Int Fam Plan Perspect* 2005;31:162–171.
- 15 Kim YM, Davila C, Tellez C, *et al.* Evaluation of the World Health Organization's family planning decision-making tool: improving health communication in Nicaragua. *Patient Educ Couns* 2007;66:235–242.
- 16 French RS, Dowie J. Using decision analysis to help young people with contraceptive choices. In: Baker B, Guthrie K, Hutchinson C (eds). *Teenage Pregnancy*. London: Royal College of Obstetricians and Gynaecologists, 2007:133–146.