iContraception®: a software tool to assist professionals in choosing contraceptive methods according to WHO medical eligibility criteria

Ramón Guisado Lopez,[1] Isabel Ramirez Polo,[2] Jose Eduardo Arjona Berral,[3] Julia Guisado Fernandez,[4] Camil Castelo-Branco[5]

For numbered affiliations see end of article.

Correspondence to
Dr Camil Castelo-Branco, Institut Clínic de Ginecologia, Obstetrícia i Neonatología, Hospital Clínic, Villarroel 170, Barcelona 08036, Spain; castelobranco@ub.edu

Received 19 April 2014
Revised 29 June 2014
Accepted 10 September 2014
Published Online First
30 October 2014

ABSTRACT

Objective To design software to assist health care providers with contraceptive counselling.

Methods The Model-View-Controller software architecture pattern was used. Decision logic was incorporated to automatically compute the safety category of each contraceptive option. Decisions are made according to the specific characteristics or known medical conditions of each potential contraception user. The software is an app designed for the iOS and Android platforms and is available in four languages. iContraception® facilitates presentation of visual data on medical eligibility criteria for contraceptive treatments.

Results The use of this software was evaluated by a sample of 54 health care providers. The general satisfaction with the use of the app was over 8 on a 0–10 visual analogue scale in 96.3% of cases.

Conclusions iContraception provides easy access to medical eligibility criteria of contraceptive options and may help with contraceptive counselling.

Key messages

- iContraception® is an app for smartphones or tablets that provides health care professionals with easy access to World Health Organization (WHO) eligibility criteria for contraceptive options.
- This software includes automatic assignment of WHO category for any contraceptive option taking into account the patient's habits and medical conditions, thus helping the health provider select an appropriate contraceptive method.
- Use of this software is intuitive and the interface design is highly appreciated by those who have tested the app.

INTRODUCTION

A wide range of effective contraceptive methods is available, with countless publications on their benefits, risks and limitations. This information is available for health care providers through institutions such as the World Health Organization (WHO), the UK Faculty of Sexual & Reproductive Healthcare (FSRH) and the USA Centers for Disease Control and Prevention (CDC). However, 50% of pregnancies in the USA remain unplanned[1] and 22% of all pregnancies end in abortion.[2] Excluding the fact that no method achieves 100% effectiveness even with perfect use, two main causes are behind this 'contraceptive failure': (1) the client does not seek the help of a health care provider and (2) the advice of the health care provider fails. One approach to address this issue would be to keep in direct contact with the client. In this way, for example, clear short messages via mobile phones have been demonstrated to be useful in countries in which health care providers are not easily accessed.[3] Another possibility would be to improve medical advice to assist providers to develop their skills and knowledge. The aim of initiatives from the WHO,[4] the FSRH[5] and, more recently, the CDC is to bring contraceptive information closer to the health care provider.[6] Following this concept and taking advantage of new technologies, we developed a software tool to assist health care providers in contraceptive counselling tasks.

To cite: Guisado Lopez R, Ramirez Polo I, Arjona Berral JE, *et al*. *J Fam Plann Reprod Health Care* 2015;**41**:142–145.

METHODS

Development phases

This app was developed following the Model-View-Controller software architecture pattern. The first step was the collection of information. The WHO *Medical Eligibility Criteria for Contraceptive Use*[7] was the main source for the scientific basis of this app. Second, all tables with treatments, conditions and medical criteria were converted into an electronic database format (app 'Model'). The next step was the development of an interface (app 'View') in which the user is able to input multiple patient conditions and visualise the results of the medical criteria computed. Subsequently, the decision logic, which computes the WHO safety and eligibility criteria of each contraceptive option for all selected medical conditions automatically (app 'Controller'), was implemented. Finally, the app was tested and debugged with potential users.

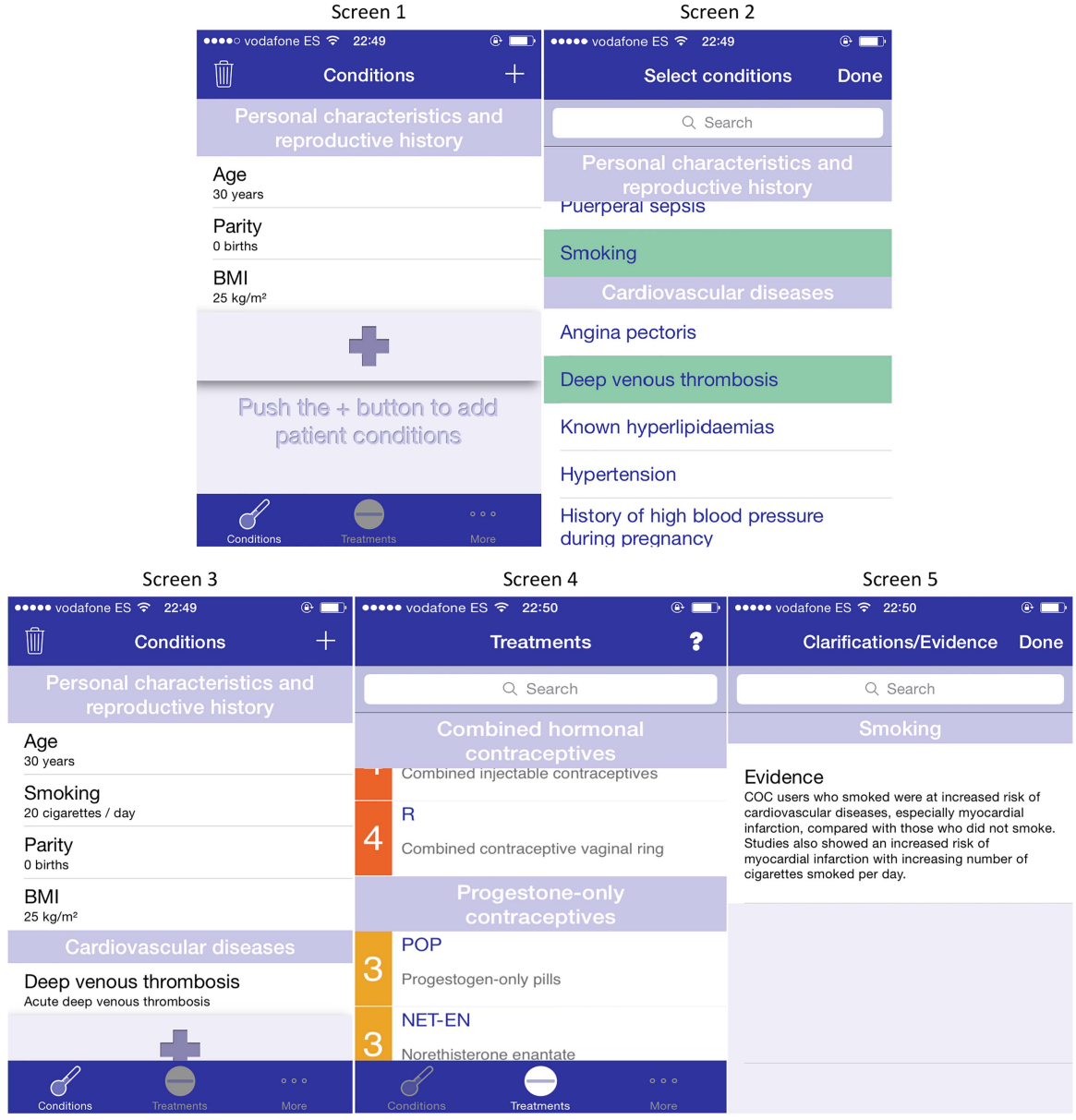

Figure 1 *Screen 1*: The first image shows the first screen of the app with a new patient. This screen is used to select the conditions (personal characteristics and known medical conditions) with which the patient presents. *Screen 2*: On selecting the + sign, a new screen opens containing all the conditions considered in the World Health Organization (WHO) document.[4 7] If a condition is chosen, this is added to the first page which gathers all the conditions presented by the patient. *Screen 3*: After adding the conditions, they can all be seen on the screen and possible errors can be corrected, erasing incorrect entries or adding further conditions. After having checked that the selection is correct, the Treatments button is pushed. *Screen 4*: This screen now opens and will show all the methods available, with the WHO category of use assigned by number and colour coding. *Screen 5*: Methods with Categories 2, 3 and 4 present the evidence available in the WHO document that justifies that category. The evidence is presented by touching the category in Screen 4 to reveal the information in a new screen.

Operation of the App

Once downloaded and installed on the smartphone or tablet from 'Google Play' or 'app Store' [Android and iOS (apple mobile operating system) platforms, respectively] its usage is intuitive and simple (Figure 1). In the first tab, the patient conditions (personal characteristics and known medical conditions) are selected as appropriate, and in the second tab the safety category of each treatment is displayed. The safety category is automatically computed each time a new condition is added, modified or deleted. In addition to the number code defined by WHO, a colour code has been assigned to each number (1: blue, 2: yellow, 3: orange; 4: red). For treatments in Category 2 and above, additional information is displayed on selection of the category, with evidence and clarifications.

Evaluation of use

To test the applicability and satisfaction with the use of the app, a survey was conducted among 54 health care providers (6 nurses, 10 primary care doctors and 38 gynaecologists) who were currently users of the app. The survey was designed by the authors and the app-quality service using a visual analogue scale (VAS), quantitatively scoring the following aspects of the app from 0 to 10:

- usefulness in contraception assessment
- user friendliness
- scientific quality
- first-time user experience
- performance
- intuitive design
- general satisfaction.

In addition, other qualitative points were assessed: positive and negative aspects to be highlighted, suggestions for improvement and promotion of app use.

RESULTS

Data related to the use of the app are shown in Table 1. The mean scores for the usefulness and scientific quality of the app were 8.83 and 8.89, respectively. In the interview, all app-related parameters were over 8.8 in a 0–10 VAS (Table 1). Moreover, 53 users stated that they would recommend the app to other health care providers. Finally, 25 users answered the questions related to positive and negative characteristics of the app. The most common positive comment was the friendliness of use (n=22/25). Only one negative comment was recorded, relating to the lack of updates of the data contained in the app.

Table 1 app user opinions on the app functionality*

Opinion	VAS score (mean±SD)	Percentage of assessments with VAS score ≥8 (%)
Usefulness	8.83±1.28	87.0
User friendliness	8.83±1.24	87.0
Scientific quality	8.89±1.63	88.9
First-time user experience	8.91±1.01	87.0
Performance	8.94±1.03	90.7
Intuitive design	8.98±1.07	94.4
General satisfaction	9.15±1.03	96.3

*A total of 54 health care providers were included in the survey (6 nurses, 10 primary care doctors and 38 gynaecologists). The survey uses a VAS that quantitatively assesses functional aspects of the app from 0 to 10 points.
SD, standard deviation; VAS, visual analogue scale.

DISCUSSION

The influence of contraceptive advice in user selection of birth control treatment and its correct usage is important.[8] Furthermore, the possibilities offered by new technologies to directly or indirectly help users through health care providers[6] are promising.

iContraception© helps the provider and client to decide on the choice of method by considering the available evidence, and enhancing provider knowledge achieves better contraceptive selection. Its free availability to any health care provider, anywhere in the world, provides an unquestionable advantage. It does not substitute, but rather adds to other initiatives seeking to bring authoritative information to health care providers.[4–7 9] Its novelty is to automatically integrate the medical conditions, habits and personal characteristics of patients, with the contraceptive treatments and their medical eligibility criteria. There is no need to search through all the documentation, thereby dramatically diminishing human errors and saving time. The speed of response and the graphical display encourages providers to use it.

Obviously, the app does not directly determine how the method is prescribed by the health care providers or used by the users, but it certainly helps in treatment choice, it safely detects the absence of contraindications, it may help to improve adherence and it provides good advice. All these aspects are factors that help to improve the quality of contraceptive advice.

iContraception is now available in four languages (English, French, Portuguese and Spanish), and it can be easily updated. Finally, and importantly, it can be downloaded free of charge from two platforms:

- Google play: https://play.google.com/store/apps/details?id=com.itiox.icontraception and
- iTunes: https://itunes.apple.com/es/app/icontraception/id668520861?mt=8.

Author affiliations
[1]Consultant in Obstetrics and Gynaecology, Unidad de Gestión Clínica de Obstetrica y Ginecología del Hospital Universitario Reina Sofía de Córdoba, Córdoba, Spain
[2]Consultant in Family Medicine, Servicio de Salud Pública, Unidad de Gestión Clínica Cayetano Roldán, San Fernando, Cádiz, Spain
[3]Associate Professor, Head of Obstetrics and Gynaecology Service, Unidad de Gestión Clínica de

Obstetrica y Ginecología del Hospital Universitario Reina Sofía de Córdoba, Córdoba, Spain
[4]Consultant in Obstetrics and Gynaecology, Servicio de Obstetricia y Ginecologia, Hospital Universitario Virgen del Rocio de Sevilla, Seville, Spain
[5]Full Professor, Head of the Endocrinological Gynecology Unit, Clinic Institute of Gynaecology, Obstetrics and Neonatology-Hospital Clinic; Faculty of Medicine, University of Barcelona, Institut d'Investigacions Biomèdiques August Pi i Sunyer (IDIBAPS), Barcelona, Spain

Acknowledgements This app was created in collaboration between the authors, who were responsible for the scientific content, and ITIOX Tecnológica S.L. (Seville, Spain; http://www.itiox.com), who developed the app itself.

Funding The app has been developed with the support of the Andalusian Health Service in order to be offered free of cost to health care professionals. The app does not allow advertisements by any registered pharmaceutical product.

Competing interests None.

Provenance and peer review Not commissioned; externally peer reviewed.

REFERENCES

1 Finer LB, Zolna MR. Unintended pregnancy in the United States: incidence and disparities, 2006. *Contraception* 2011;84:478–485.
2 Jones RK, Kooistra K. Abortion incidence and access to services in the United States, 2008. *Perspect Sex Reprod Health* 2011;43:41–50.
3 Fhi360. m4RH-Kenya. http://m4rh.fhi360.org/ [accessed 25 July 2013].
4 World Health Organization. WHO Medical Eligibility Criteria Wheel for contraceptive use (2008 update). http://www.who.int/reproductivehealth/publications/family_planning/wheel_v4_2010_EN.swf [accessed 25 July 2013].
5 Faculty of Sexual & Reproductive Healthcare. *UK Medical Eligibility Criteria for Contraceptive Use (UKMEC 2009)*. 2009. http://www.fsrh.org/pdfs/UKMEC2009.pdf [accessed 25 July 2013].
6 Curtis KM, Tepper NK, Jamieson DJ, *et al*. Adaptation of the World Health Organization's Selected Practice Recommendations for Contraceptive Use for the United States. *Contraception* 2013;87:513–516.
7 World Health Organization (WHO). *Medical Eligibility Criteria for Contraceptive Use* (4th edn). Geneva, Switzerland: WHO, 2009.
8 Carter MW, Berdall AR, Henry-Moss D, *et al*. A qualitative study of contraceptive understanding among young adults. *Contraception* 2012;86:543–550.
9 Centers for Disease Control and Prevention. U.S. Medical Eligibility Criteria for Contraceptive Use, 2010. *MMWR Recommendations* and *Reports*. 18 June 2010/59 (RR04); 1–6. http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5904a1.htm?s_cid=rr5904a1_e (updated http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6026a3.htm and http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6124a4.htm) [accessed 15 July 2013].