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Original research article

The role of training in effective simulated self-injection of subcutaneous depot medroxyprogesterone acetate: observations from a usability study☆

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Abstract

Objectives: The need for quarterly clinic visits is a barrier to use of subcutaneous depot medroxyprogesterone acetate (DMPA-SC) contraception. The ability to self-inject at home may enhance method acceptance. Since efficacy depends on proper administration, we evaluated whether women could correctly perform simulated injections of DMPA-SC in a Uniject™ injection system using printed Instructions for Use (IFU), with and without hands-on training.

Study design: Adult female volunteers ($N=120$) injected DMPA-SC into a rubber trainer at two visits, 3 months apart. Women were randomly assigned to receive hands-on training before the first injection or no training. The primary outcome was the proportion of women who successfully operated the injection system. An attempt was defined as successful if the participant correctly performed all critical steps in the injection procedure (getting ready, selecting an injection area, preparing the injector, mixing the medicine, activating the injector, injecting the dose) and expelled the dose without unexpected interruption. The success rate at month 3 was considered the primary endpoint. A one-sided 95% confidence limit >80% was used to declare the delivery system and IFU "fit for purpose."

Results: With training, the success rate (one-sided 95% confidence limit) was 90.0% (81.8%) at day 1 and 96.7% (90.4%) at month 3; without training, rates were 76.7% (66.7%) and 88.3% (79.8%), respectively. The trained (96.4%) and untrained (92.2%) groups successfully completed injecting into the trainer at first injection, the final critical step of the injection procedure, despite the fact that about one third of participants considered expelling depot medroxyprogesterone acetate (one component of this step) to be difficult.

Conclusion: Most participants understood the IFU and successfully operated the injection system. Initial hands-on training improved success rates at both visits. For women interested in self-injection, providers should review all steps of the IFU, provide a demonstration, supervise initial injection(s) and ensure that the patient is aware of future injection dates. The potential for self-injection to improve adherence should be studied.

Implications: After initial training, women performed simulated self-injections of DMPA-SC in the Uniject system proficiently using printed instructions. Women who are motivated and demonstrate competent injection technique during training can be relied upon to self-inject correctly at home. DMPA-SC users not suitable for self-injection should continue receiving injections at the clinic.

Keywords: Self-administration; Medroxyprogesterone acetate; Injections; Contraception; Uniject; Patient education

1. Introduction

Injectable depot medroxyprogesterone acetate (DMPA) is a well-tolerated, effective contraceptive administered every 3 months [1]. Low-dose (104 mg), subcutaneous depot medroxyprogesterone acetate (DMPA-SC) is as effective as the original 150 mg intramuscular DMPA formulation, with a similar safety profile [2]. DMPA-SC is available in prefilled syringes or, in some countries, in the nonreusable Uniject™ injection system (Sayana® Press, Pfizer Inc).

One potential barrier to use of DMPA is the need for clinic visits every 3 months [3–6]. In one survey, women attending a large family planning clinic in Edinburgh indicated that they would be more accepting of this method if self-injection was an

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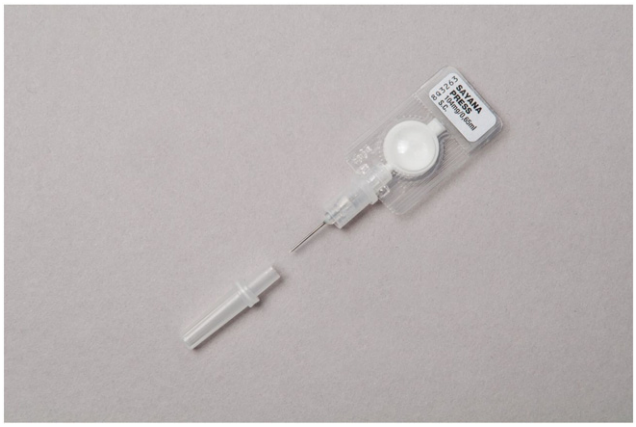

Fig. 1. DMPA subcutaneous injection in the Uniject™ system (Sayana Press®) (Photo courtesy of PATH). DMPA, depot medroxyprogesterone acetate.

option [6]. Self-injection of DMPA-SC in prefilled syringes has been shown to be feasible [3–5,7]. Uniject (Fig. 1) is a single-use injection system with a short needle that may be suitable for self-injection [8,9]. The Uniject has a one-way valve that prevents refilling and reuse [10]. It has been used in Africa, Asia and Latin America to administer vaccines and other subcutaneous medications [9].

Sayana Press is currently approved in the European Union and several other countries; Sayana Press is not available in the United States. PATH (an international nonprofit health organization), the Gates Foundation, US Agency for International Development, UK Department for International Development, UN Population Fund, the Children's Investment Fund Foundation and Pfizer are collaborating to help enable access to Sayana Press in sub-Saharan Africa and South Asia, including areas where access to modern contraceptive methods is limited. In some areas, trained lay community health care workers administer Sayana Press and other medications using the Uniject system [9,11,12].

We conducted a usability study to evaluate the feasibility of self-injection of Sayana Press. Usability testing assesses if representative users can correctly operate a medical device — or, in this case, an injection system — without making potentially dangerous errors. Usability studies typically involve simulated use with no actual drug administration [13,14]. These studies focus on the usability of the device itself and the adequacy of the Instructions for Use (IFU) and also allow for assessment of user preferences. Our aim was to determine if women can accurately interpret the IFU and successfully operate the Uniject system on study day 1 and again 3 months later, reflecting the prescribed dosing schedule for Sayana Press. Additional goals were to assess the types of errors made by participants and determine whether hands-on training enhances correct use.

2. Methods

2.1. Trial design

In this open-label study (EudraCT 2013-002280-25), conducted at Erasmus Hospital, Belgium, participating women injected Sayana Press into a commercially available rubber/foam injection trainer placed on a table. They repeated the injection procedure 3 months later. Participants were randomly assigned via computer-generated sequence to receive training at the first study visit only or no training; all were given a modified copy of the IFU (Supplementary Fig. 1 in the online version at http://dx.doi.org/10.1016/j.contraception.2016.05.006). Before the trained group performed their first injection, study staff reviewed all steps in the IFU, performed a brief demonstration of the Uniject system, allowed the participant to handle the device and responded to questions; no additional training was provided at month 3. The untrained group was provided only with the printed IFU at both visits, with no demonstration, no hands-on experience and no questions answered at either visit.

The study was approved by the Institutional Review Board/Independent Ethics Committee at the participating site and was conducted in compliance with principles of the Declaration of Helsinki and International Conference on Harmonization Good Clinical Practice Guidelines. All participants provided written informed consent.

2.2. Participants

To ensure at least approximately 100 women returned for the second study visit at month 3, the study recruited 120 healthy adult female volunteers aged 18–45 years (inclusive). Ethics committees approved recruitment procedures, which included investigator databases. Women were excluded if they had prior experience administering parenteral medications to humans or animals, had participated in an investigational drug study within the last 30 days, were currently pregnant or breastfeeding or had significant impairment of manual dexterity or other medical condition that might compromise their ability to operate the delivery system or increase participant's risk. As is customary for studies of healthy volunteers, the subjects were compensated for their participation.

2.3. Outcomes and methods

The primary outcome was the proportion of participants who correctly performed all steps in the IFU and expelled the entire dose into the trainer at month 3. A staff member directly observed each participant and used a standardized Observer Assessment Tool to record data. The Observer Assessment Tool contained 12 questions; 6 questions assessed successful completion of a specific IFU step while the remainder sought evidence of mechanical malfunction or other particular difficulties a participant might have encountered during the injection attempt. Staff providing training did not serve as observers for participants they had trained. An independent assessor (i.e., not a site or Pfizer employee) was present during all injection attempts and recorded any information or observations potentially not captured by the standard data collection tools.