

# Development of a High-Fidelity Simulator for Teaching Chorionic Villus Sampling

Darine El-Chaar, MD, MSc;<sup>1</sup> Jennifer Manley;<sup>2</sup> Francis LeBouthillier, MFA, AOCA;<sup>3</sup> Greg Ryan, MB, MSc;<sup>2</sup> Rory Windrim, MB, MSc<sup>2</sup>

<sup>1</sup>Department of Obstetrics and Gynecology, The Ottawa Hospital, Ottawa, ON

<sup>2</sup>Fetal Medicine Unit, Mount Sinai Hospital, University of Toronto, Toronto, ON

<sup>3</sup>Ontario College of Art and Design, Toronto, ON

## Abstract

**Objective:** The objective of this study was to develop a synthetic high-fidelity simulator for teaching chorionic villus sampling.

**Methods:** Working with a medical sculptor, the authors developed a simulator, constructed from various synthetic rubber materials, of a gravid female pelvis, including the vulva, vagina, cervix, and a 13-week-sized uterus with a gestational sac.

**Results:** This simulator is high fidelity and durable, and it does not require any organic materials. Maternal-fetal medicine trainees valued this educational tool.

**Conclusion:** This novel, high-fidelity simulator is an additional tool for educators involved in teaching chorionic villus sampling.

## Résumé

**Objectif :** Cette étude avait pour but de concevoir un simulateur synthétique de haute fidélité aux fins d'enseignement du prélèvement de villosités choriales.

**Méthodologie :** Les auteurs ont conçu, avec l'aide d'un sculpteur médical, un simulateur, construit à partir de divers matériaux en caoutchouc synthétique, représentant le pelvis d'une femme enceinte; la vulve, le vagin, le col utérin et un utérus contenant un sac gestationnel de 13 semaines y sont notamment reproduits.

**Résultats :** Durable et de haute fidélité, ce simulateur n'a besoin d'aucune matière biologique. Cet outil éducatif a d'ailleurs été apprécié par les stagiaires en médecine fœto-maternelle.

**Conclusion :** Ce simulateur de haute fidélité novateur est un outil de plus à l'arsenal des éducateurs chargés d'enseigner le prélèvement de villosités choriales.

Copyright © 2017 The Society of Obstetricians and Gynaecologists of Canada/La Société des obstétriciens et gynécologues du Canada. Published by Elsevier Inc. All rights reserved.

J Obstet Gynaecol Can 2017;■■(■■):■■-■■

<https://doi.org/10.1016/j.jogc.2017.10.028>

**Key Words:** Chorionic villus sampling, training, high-fidelity simulator, perinatal procedure, maternal-fetal medicine

Corresponding Author: Dr. Rory Windrim, Fetal Medicine Unit, Mount Sinai Hospital, University of Toronto, Toronto, ON. [rory.windrim@sinaihealthsystem.ca](mailto:rory.windrim@sinaihealthsystem.ca)

Competing interests: See Acknowledgements.

Received on August 14, 2017

Accepted on October 20, 2017

## INTRODUCTION

Chorionic villus sampling is an established perinatal procedure to detect fetal genetic abnormalities between 10 and 14 weeks' gestation. Although non-invasive prenatal testing has reduced the frequency of invasive perinatal testing, CVS continues to be required as a clinical service in most perinatal centres. Challenges for educators have included the reduced frequency of these procedures and concerns regarding the recognized fetal and maternal risks of the procedure. These two factors together create difficulty in teaching junior trainees the technical skills involved in CVS. Recent years have seen a large increase in the use of simulation to teach high-acuity, low-incidence procedures. We previously developed a simulator for teaching amniocentesis,<sup>1</sup> and this simulator has been used for teaching amniocentesis by centres in many countries. However, the amniocentesis simulator is not useful for teaching CVS because it lacks both a placenta and a simulated vagina and cervix through which transcervical CVS could be simulated. We undertook to develop a high-fidelity simulator to provide a low-risk, low-stress environment for trainees wishing to acquire skill in CVS.

## METHODS

### Simulator Development

Over a 2-year period, and many iterations of the tactile and ultrasound fidelity of the materials involved, we developed a high-fidelity simulator, constructed from various synthetic rubber materials, of a gravid female pelvis containing a 13-week-sized uterus with a gestational sac, including the vulva, vagina, and cervix (Figures 1 and 2). The model was custom designed and manufactured by the medical sculptor (F.L.) who had previously collaborated with the investigators in the development of their amniocentesis model.<sup>1</sup> His simulator was designed to the following specifications: independent of the need for organic materials; acceptable ultrasound visualization; facilitating both

## ABBREVIATIONS

CVS	chorionic villus sampling
NIPT	non-invasive prenatal testing
TACVS	transabdominal chorionic villus sampling
TCCVS	transcervical chorionic villus sampling

transabdominal and transcervical approaches; possessing realistic tactile and haptic qualities; combining high durability with relatively low cost. Some trial and error iterations of the simulator were required before the simulator adequately met the previously detailed specifications. Research ethics board approval was not necessary for this project.

## Educational Use

The model was trialed with Maternal-Fetal Fellowship Program trainees at the University of Toronto and University of Ottawa. Participants received a specifically designed educational module consisting of a didactic lecture followed by a hands-on training session with the simulator, proctored by faculty staff. This lecture reviewed pre-procedure counselling, materials required for the procedure, and ultrasound techniques involved in CVS. The presentation then reviewed both transabdominal and transcervical procedures in detail. Finally, post-procedure bedside microscope determination of sample adequacy, post-procedure counselling, and appropriate documentation requirements were also discussed.

**Figure 1. High-fidelity simulator of a gravid female pelvis.**



**Figure 2. CVS procedure and ultrasound imaging on simulator.**



Following the lecture, all trainees moved to the procedure room and repetitively carried out CVS on the simulator, assisted by attending staff. The number of practised procedures and the time allotted were not limited in the study protocol. This hands-on component of the teaching continued until each trainee expressed comfort with CVS and believed that no further procedures were required.

## Evaluation

All trainees reported that they found the in vitro CVS simulation model to be effective in helping maternal-fetal medicine trainees gain skills and confidence for approaching in vivo situations.

## DISCUSSION

### Chorionic Villus Sampling

CVS is an established, invasive diagnostic procedure performed to diagnose fetal chromosomal abnormalities and other genetic disorders. It is the only invasive procedure available to patients in the first trimester and is performed between 10 and 14 weeks' gestation. Results of testing at this earlier gestational age allow more time for patient counselling and decision making. Indications for CVS include advanced maternal age, ultrasound or non-invasive screening results suggestive of aneuploidy, a prior aneuploid pregnancy, or family history of an inherited genetic disorder.<sup>2</sup>

Although NIPT has reduced the incidence of prenatal testing overall, CVS continues to be a required service in prenatal diagnosis programs. The positive predictive values of NIPT

Download English Version:

<https://daneshyari.com/en/article/11021996>

Download Persian Version:

<https://daneshyari.com/article/11021996>

[Daneshyari.com](https://daneshyari.com)