There's an App for That: Vaginal Hysterectomy

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Abstract

Objective: To create an instructional app which includes medical knowledge, procedural steps and assessments based on the American Congress of Obstetrician and Gynecologists (ACOG) curriculum for vaginal hysterectomy.

Methods: A survey of recent medical education literature and the use of app technology found that millennial trainees prefer engaging technology-enhanced learning opportunities. The vaginal hysterectomy procedure currently has a variety of resident evaluations and case tracking methods.

Results: Key features of the application include: 1) ACOG curriculum for vaginal hysterectomy, 2) a complete step by step live and simulated surgical video tutorial, 3) a procedural step by step assessment (10 steps-- 0-10 score), 4) a global surgical rating scale (7 metrics), and 5) a knowledge based assessment (4 metrics, 0-4 scale). The data captured on the app can be accessed via IPAD and iPhone mobile devices and is verified by Apple. The evaluations can be directly emailed to any database.

Conclusion: A comprehensive instructional surgery app coupled with real time assessment will provide greater learning efficiency and will more effectively improve surgical skills. This app has the potential to standardize surgical evaluation in the operating room and provide a more efficient method to track surgeon competency using ACOG guidelines. The assessment is currently employed by the ACOG Simulation Consortium Working group during vaginal hysterectomy simulation and is part of a surgical simulation course certified by the ABOG for MOC credits.

Introduction

Vaginal hysterectomy is well-established as the preferred route when feasible. A 2009 ACOG committee opinion[1] and the 2015 Cochrane review came to this conclusion.[2] In January 2017, the clinical decision tree developed by Schmitt et al[3] found that, when feasible, vaginal hysterectomy should be the route of choice given its shorter operative times, lower infection rate, and lower cost. However, rates of vaginal hysterectomy are on the decline. In assessing hysterectomy route rates in the Nationwide Inpatient Sample database, Wright et al[4] described vaginal hysterectomy's drop from 24.8% in 1998 to 16.7% in 2010 while the rates of laparoscopic and robotic-assisted hysterectomy increased. A retrospective cohort study of the Premier database by Moawad et al[5] found laparoscopic and robotic-assisted hysterectomy rates increased while vaginal approach decreased from 2008 to 2014.

Significant challenges exist in teaching the vaginal hysterectomy procedure, including a small operative window, reliance on sensory skills, and lack of assessment tools for resident performance. In the current climate of restricted residency work hours and decreased hysterectomy volume, residents are graduating as gynecologic surgeons who are not confident nor ready to perform vaginal hysterectomies independently. In a 2011 survey, Burkett et al[6] found that only 38.1% of program directors and 27.8% of residents felt that graduating residents were completely prepared to perform a vaginal hysterectomy. A 2015 survey of program directors by Guntipalli et al[7] reported that only 20% of first-year fellows in Ob/Gyn subspecialties could independently perform a vaginal hysterectomy. Graduating Ob/Gyn residents are not competent per ACOG guidelines, indicating that the traditional training methods for vaginal hysterectomy are not sufficient.

Materials and Methods

In their American Journal of Obstetrics & Gynecology (AJOG) Expert Review, Hopkins et al[8] comment on the adaptation of medical curriculum to the techno-savvy Millennial learner. Many programs have adopted web-based, self-directed learning to engage the shorter attention spans of trainees. These learners also appreciate non-traditional training methods like game-style group activities and hands-on simulation.[8] In their expert piece published last year, Gutman et al[9] advocated for surgical simulation "to hone psychomotor, technical and judgment skills in a lowkey environment." The Fundamentals of Laparoscopic Surgery (FLS) curriculum is the current poster child for non-traditional, technology-enhanced surgical simulation.[10] Fanning et al[11] applied the FLS curriculum to the Millennial skillset by pitting 15 video game-experienced teenagers against 15 postgraduate year I Ob/Gyn residents in completing three tasks on the laparoscopic simulator. Not surprisingly, the teenagers performed all tasks significantly faster than the residents, suggesting that simulator training may be conducive to Millennial trainees.[11] The validity and success of the FLS curriculum led to its inclusion as a prerequisite for the American Board of Surgery examination. In addition, the American Board of Obstetricians and Gynecologists (ABOG) announced in January 2018 that it will be a prerequisite for the board examination starting with graduates after May 2020. Simulation allows the techno-savvy resident a patient complication-free environment to learn procedural skills.

In their extensive review of surgical simulation, Zevin et al[12] argue that proficiency-based training is an essential component of a comprehensive simulation curriculum and that it "requires feasible, reliable, and valid scales for objective assessment of surgical skills." Without a standard and valid assessment for simulated or live vaginal surgery, training programs rely on a variety of non-validated assessment tools.

The Accrediting Council for Graduate Medical Education (ACGME) requires resident training programs to provide documentation of each trainee's surgical competency. To accomplish this, the assessment tool needs to be feasible and reliable. Yet, there is considerable variation amongst the published assessment tools. Currently, four assessment tools are in use for vaginal hysterectomy surgery: ACGME milestones, Objective Structured Assessment of Technical skills (OSATS), Vaginal Surgical Skills Index (VSSI), and myTipReport.[13-16] The ACGME milestones are the basis for each of the other three evaluations but is not an accessible form for use. The OSATS global rating scale has good reliability and validity with simulation models, but only evaluates for general surgical skills and not procedure specific knowledge or skill.[13] Chen et al[14] demonstrated construct validity and good interrater and intrarater reliability with the Vaginal Surgical Skills Index. Connolly et al[15-16] have begun to establish construct validity for myTipReport and feasibility with trainees receiving workplace feedback in this format. The creators of my Tip Report have taken into account the importance of real-time performance feedback for effective trainee learning. Yet, none of these evaluations address the lack of a standardized and effective curriculum for vaginal hysterectomy.

Results

Developed in the last two years, the Miya Model app is a complete education tutorial for vaginal hysterectomy designed for the millennial learner. The online app provides a convenient, centralized location for materials that represent a standard for the procedure's curriculum. Along with ACOG learning materials, the app includes a video tutorial using both a live case and a case on the high-fidelity Miya Model pelvic simulator. The online platform allows real-time objective and subjective assessment with automatic feedback, enhancing resident learning and improvement.

The Miya Model app takes advantage of available resources and assessments from the ACOG and ACGME. These resources are available online; this app brings them together in a single interface. The app includes the ACOG Simulation Working Group's assessment and the Global Rating Scale (GRS) in easy-to-use formats. The Miya Model app is Apple certified and was presented by Dr. Douglas Miyazaki at the 2018 CREOG/APGO annual meeting.

ACOG Simulation Working Group: Vaginal Hysterectomy Learning Objectives. This resource provides the trainee with the two levels of knowledge required to perform the surgery: declarative knowledge and simulated/clinical performance steps.[17] The declarative knowledge section outlines the basic information a resident should know before walking into the live procedure, including its benefits, indications and contraindications, anatomic landmarks, and documentation. The second section outlines the specific steps of both preparation and the procedure. Ready access to these resources enables the trainee to learn faster and perform better.

Step-by-Step Live and Simulated Surgical Video Tutorial. A critical learning resource provided by the app is a combined live and simulated video tutorial of vaginal hysterectomy. Provided by Dr. Douglas Miyazaki of Woman Care in Winston-Salem, NC, and Dr. Mark Walters of Cleveland Clinic, the tutorial engages the trainee in following the procedure step-by-step on both a live case and the Miya Model pelvic simulator. This tutorial is available through the ACOG Simulation Working Group Toolkit.

ACOG Simulation Working Group: Knowledge and Procedural Step Assessments. These assessments represent the two quantitative sections of the three-part evaluation available on the app. The Knowledge Assessment serves as a four-question guide for the evaluator to inquire about the same concepts presented in the declarative knowledge section of the Learning Objectives. The Simulated and Clinical Performance Assessment breaks the preparation and procedural sections of the Learning Objectives down into ten steps each. The 24 questions from these two assessments ask the evaluator to simply mark 0 (no) or 1 (yes), making these sections easy to evaluate during a simulated performance and faster to complete after a live procedure.

These sections provide a quantitative assessment of knowledge and performance and can help assess surgeon competency for the procedure.

Global Rating Scale of Operative Performance. The last section of the evaluation is a 7-item global rating scale based on the Objective Structured Assessment of Technical Skill (OSATS) developed by Dr. Reznick et al.[13] This brief questionnaire asks the supervising surgeon to qualitatively assess the trainee's general surgical skills on a five-point scale. These skills include respect for tissue, time and motion, instrument handling, knowledge of instruments, use of assistants, flow of operation, and knowledge of the procedure. This evaluation has shown high reliability and construct validity in bench model simulation.[13]

The Miya Model app is verified by Apple and can be accessed via iPad and iPhone mobile devices. Furthermore, all assessment results can be directly emailed to any database with feedback distributed to the residents automatically. Results are available by question in pdf format and scores for each area of assessment (knowledge, performance, and GRS) are automatically calculated and presented in graph format.

Discussion

The Miya Model app is a comprehensive instructional surgery app coupled with real time assessments. The centralized source for learning and assessment materials is conducive to the millennial learner. This app can improve learning efficiency and enhance resident surgical performance. The ACOG-approved objectives and procedural steps provide the resident with the standard knowledge he/she needs before stepping up to a simulator or into an operating room. The step-by-step video tutorial engages the learner to follow along on his own high-fidelity simulator or provides a brief review before he enters the operating room.

The app includes easy-to-use assessment tools that have the potential to standardize resident performance and competency evaluation for both simulation and in the operating room. The objective and subjective evaluation forms are designed simply for the ease of the busy attending physician. The results are automatically sent to a tracking database and to the learner, who can learn better from the immediacy of the feedback. With its database compatibility, the app can be a more efficient method for residency programs to track trainee performance per ACOG guidelines.

The Miya Model app is in the process of being adapted for other gynecologic procedures, including midurethral slings. The convenience and efficiency of the app make it a desirable alternative to the discoordination of residents searching for online learning materials coupled to the variety of assessment forms available. With its mindful design, the format of this app may be considered for expansion to procedures in many other specialties .

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