Abstract:

Title: Vaginal Hysterectomy (TVH) Simulation: a tool for improving surgical competency

Summary: We will use simulation to teach TVH, an important gynecologic surgical technique with decreasing teaching opportunities[1]. This study encompasses three sub-parts:
Part A: We will survey residents (Survey A1) as to their confidence level performing TVH as well as how many procedural steps they can perform independently in the OR. We will assess if confidence and amount of surgical autonomy increase with addition of simulation to the curriculum.
Part B: We will survey graduates of our program annually (Survey B) to evaluate if our graduates are performing TVH and if adding simulation to their training increases the numbers of TVH they perform.
Part C: We will initiate a regional "TVH Tips and Tricks" CME course – participants can opt into our annual survey of residency graduates (Survey B).

Hypothesis: Using a low-fidelity, anatomically accurate vaginal hysterectomy simulation model[2,3] to teach TVH three times each during the 3rd & 4th years of ob/gyn residency (**Part A**) or as part of a post-graduate CME (**Part C**)"Tips and Tricks for TVH course" will improve:

1. Ability to complete more vaginal hysterectomy steps in the OR independently (Survey A1) due to increased familiarity with the procedure and increased surgical confidence
2. Number of TVH performed by residents (ACGME numbers)
3. Confidence and annual self-reported number of TVH from graduates & CME participants (Survey B)

Research question: We are losing familiarity with TVH in ob/gyn, can we alter that trajectory by utilizing simulation?

Background and Significance:

Nationwide, ob/gyn residents are struggling to achieve competency in transvaginal hysterectomy. Subsequently, the field of ob/gyn is losing its familiarity with this approach, well known to be the most minimally invasive and economical approach to hysterectomy[4,5]. We anticipate this study will increase confidence in this important surgical technique, and thus increase the number of hysterectomies being performed vaginally.

ACOG has an online simulation module that we will modify for use during this study:
https://www.acog.org/education-and-events/simulations/scog008/simulation

Multiple vaginal hysterectomy simulation models have been developed and a few have been validated, one model has been validated across multiple sites on many residents[2]:
ACOG Simulations Working Group Toolkit: Anatomic Low-Fidelity Vaginal Hysterectomy Simulation:
https://www.acog.org/-/media/project/acog/acogorg/files/pdfs/education/simulations-working-group-resources/anatomic-low-fidelity-simulation-model-for-vaginal-hysterectomy.pdf?la=en&hash=13BBD86A8391015CF42900A8265F8218

Study Design

Part A: Third and 4th year residents will begin filling out Survey A1 after each TVH or LAVH performed. They will be scheduled for the following intervention each academic year:

Simulation #1 Structure (2hr)

1. 20 min CREOG Surgical Skills Task Force TVH sim slides
    - https://www.acog.org/education-and-events/simulations/scog008/simulation
2. 10 min Case discussion – surgical technique and management pitfalls
3. 30 min Simulation
    - 4th years taught 1:1 faculty
    - 3rd years taught 4:1 faculty, with 4th years assisting them
4. 20 min Debrief and Survey A2

Simulation #2, & #3 Structure (1 hr each)

1. 30 min Simulation
    - 4th years taught 1:1 faculty
    - 3rd years taught 4:1 faculty, with 4th years assisting them
2. 20 min Debrief and Survey A2

Part B: Ob/gyn graduates from the last 5 years will receive Survey B annually. Each successive year of graduates will be added in to receive Survey B through 2025.

Part C: Community ob/gyn physicians who participate in the CME "Tips and Tricks to TVH" course and who opt in will receive Survey B annually.

Other institutions will be invited to participate. They will join CoRPS and obtain IRB approval at their institutions. Each institution will manage their data, annually data will be merged for statistical analysis. This is an education research project; no patient information will be included. All surveys will be anonymous.

Specific aims:

Part A:

1. Using Survey A1 we will measure the resident baseline confidence in performing vaginal hysterectomy as well how many steps of the procedure the resident feels they performed independently.
2. Using Survey A1 and Survey A2 we will measure if resident confidence in performing vaginal hysterectomy improves after simulations as well as if the residents are independently performing more steps of vaginal hysterectomy in the OR.

Part B:

1. Using Survey B we will measure how often ob/gyn residency graduates perform vaginal hysterectomies and what their confidence level in the procedure is. We will administer Survey B annually to see if post-graduate vaginal hysterectomy numbers are increasing after TVH simulation was added into the curriculum.

Part C:

Using Survey B we will record how many TVH participants of a CME "Tips and Tricks for TVH course" are performing and what their confidence level in the procedure is. We will determine if participation in the CME course increases their TVH numbers and confidence in performing the procedure.

Participant inclusion criteria:

Part A: Ob/gyn residents in their 3rd and 4th years will be invited to participate in the study.

Part B: Former residents will be invited to participate

Part C: Community ob/gyn CME "Tips and Tricks for TVH" participants will be invited to participate

Participant exclusion criteria:

1. Former residents in fellowship
2. Former residents who do not practice gynecology

Feasibility

This TVH simulation model has already been used across a wide range of ob/gyn residencies while undergoing validation[2], proving that model creation and use for simulation across multiple residency programs if feasible. The model is inexpensive and reproducible. The resources to teach how to make the model are readily available. Time is often the obstacle in ob/gyn residencies; however, this simulation is educational and thus could be done during protected didactics time.

1. Weblink to setup instructions accessible in PDF format (https://www.dropbox.com/s/mapr9q2n04x0h98/RevisedPelvis.pdf?dl=0)
2. Weblink to setup instructions accessible in video format https://www.dropbox.com/s/su773uwipesyk6c/Anatomic%20Low%20Fidelity%20Simulation%20Model%20For%20Vaginal%20Hysterectomy%20APGO%20Surgical%20Education%20Scholars.mp4?dl=0).

Budget

Initial cost of model set up & simulation = $200, program will need one model/four residents
Cost of subsequent simulations = $15 per simulation

Annual cost for:

4 resident/year ob/gyn program:
$200 x 2 initial simulations = $400
4 R3 + 4 R4 = 8R 8R x 3 sim/year = 24
24-2 initial sim = 22
$15 x 22 repeat simulations = $330
$730

8 resident/year ob/gyn program:
$200 x 4 initial simulations = $800
8 R3 + 8 R4 = 16R 16R x3 sim/year = 48
48-4 initial sim = 44
$15 x 44 repeat simulations = $660
$1,460

Other potential costs may include:
Statistician
IRB Services

References:

1. Morgan DM, Kamdar NS, Swenson CW, Kobernik EK, Sammarco AG, Nallamothu B. Nationwide trends in the utilization of and payments for hysterectomy in the United States among commercially insured women. *American journal of obstetrics and gynecology.* 2018;218(4):425.e421-425.e418.
2. Aguirre F, Cross S, Edelson M, Frenn R, Kansagor A, Kenny B, Moffitt MN, Zoorob D, Banks E. Validation of an anatomically accurate, low fidelity vaginal hysterectomy model. APGO SES Surgical Scholars Poster Presentation, Feb 2020, Orlando, Fl. (Submitted for publication)
3. Barrier BF, Thompson AB, McCullough MW, Occhino JA. A novel and inexpensive vaginal hysterectomy simulator. *Simul Healthc.* 2012;7(6):374-379.
4. Washburn EEMD, Cohen SLMDMPH, Manoucheri EMD, Zurawin RKMD, Einarsson JIMDMPHP. Trends in Reported Resident Surgical Experience in Hysterectomy. *Journal of Minimally Invasive Gynecology, The.* 2014;21(6):1067-1070.
5. Gressel GM, Potts III JR, Cha S, Valea FA, Banks E. Hysterectomy route and numbers reported by graduating residents in obstetrics and gynecology training programs. Obstetrics & Gynecology 2020; 135(2): 268-73.

Time line All Parts

- 9/15/20 begin IRB submission
  - After approval, invite others to join
- 06/2021
  - Repeat invitation to join for 2021-2022
- 06/2022
  - Repeat invitation to join for 2022-2023
- 06/2023
  - Repeat invitation to join for 2023-2024
- 06/2024
  - Repeat invitation to join for 2024-2025
- 07/2025
  - Analysis of confidence/procedural steps surveys from preintervention to post (Survey A1 and Survey A2)
  - Analysis of confidence surveys from post intervention to graduates (Survey A1, Survey A2 and Survey B)
  - Analysis of change in TVH number by residents (ACGME #)
  - Analysis of change in TVH numbers by department

Time line Part A

- After each TVH or LAVH in OR, 3rd and 4th year residents will complete Survey A1, continue for 5 years
- 12/2020 Simulation #1 (2 hours each)
  - Four 4th years on day X, with 4 faculty assists
  - Four 4th years on day Y, with 4 faculty assists
  - Four 3rd years on day X, with 1 faculty and four 4th years
  - Four 3rd years on day Y, with 1 faculty and four 4th years
- 02/2021 Simulation #2 (1 hour each)
  - Four 4th years on day X, with 4 faculty assists
  - Four 4th years on day Y, with 4 faculty assists
  - Four 3rd years on day X, with 1 faculty and four 4th years
  - Four 3rd years on day Y, with 1 faculty and four 4th years
- 04/2021 Simulation #3 (1 hour each)
  - Four 4th years on day X, with 4 faculty assists
  - Four 4th years on day Y, with 4 faculty assists
  - Four 3rd years on day X, with 1 faculty and four 4th years
  - Four 3rd years on day Y, with 1 faculty and four 4th years
- 07/2021
  - Analysis of confidence/procedural steps surveys from preintervention to post (Survey A1 and Survey A2)
  - Analysis of confidence surveys from post intervention to graduates (Survey A1, Survey A2 and Survey B)
  - After each TVH/LAVH in OR, 3rd and 4th year residents will complete Survey A1, continue for 4 years
- 11/2021 Simulation #1 (2 hours each)
  - Four 4th years on day X, with 4 faculty assists
  - Four 4th years on day Y, with 4 faculty assists
  - Four 3rd years on day X, with 1 faculty and four 4th years
  - Four 3rd years on day Y, with 1 faculty and four 4th years
- 01/2022 Simulation #2 (1 hour each)
  - Four 4th years on day X, with 4 faculty assists
  - Four 4th years on day Y, with 4 faculty assists
  - Four 3rd years on day X, with 1 faculty and four 4th years
  - Four 3rd years on day Y, with 1 faculty and four 4th years
- 03/2022 Simulation #3 (1 hour each)
  - Four 4th years on day X, with 4 faculty assists
  - Four 4th years on day Y, with 4 faculty assists
  - Four 3rd years on day X, with 1 faculty and four 4th years
  - Four 3rd years on day Y, with 1 faculty and four 4th years
- 07/2022
  - Analysis of confidence/procedural steps surveys from preintervention to post (Survey A1 and Survey A2)

        - Analysis of confidence surveys from post intervention to graduates (Survey A1, Survey A2 and Survey B)
        - After each TVH/LAVH in OR, 3rd and 4th year residents will complete Survey A1, continue for 3 years
    - 11/2022 Simulation #1 (2 hours each)
        - Four 4th years on day X, with 4 faculty assists
        - Four 4th years on day Y, with 4 faculty assists
        - Four 3rd years on day X, with 1 faculty and four 4th years
        - Four 3rd years on day Y, with 1 faculty and four 4th years
    - 01/2023 Simulation #2 (1 hour each)
        - Four 4th years on day X, with 4 faculty assists
        - Four 4th years on day Y, with 4 faculty assists
        - Four 3rd years on day X, with 1 faculty and four 4th years
        - Four 3rd years on day Y, with 1 faculty and four 4th years
    - 03/2023 Simulation #3 (1 hour each)
        - Four 4th years on day X, with 4 faculty assists
        - Four 4th years on day Y, with 4 faculty assists
        - Four 3rd years on day X, with 1 faculty and four 4th years
        - Four 3rd years on day Y, with 1 faculty and four 4th years
    - 07/2023
        - Analysis of confidence/procedural steps surveys from preintervention to post (Survey A1 and Survey A2)
        - Analysis of confidence surveys from post intervention to graduates (Survey A1, Survey A2 and Survey B)
        - After each TVH/LAVH in OR, 3rd and 4th year residents will complete Survey A1, continue for 2 years
    - 11/2023 Simulation #1 (2 hours each)
        - Four 4th years on day X, with 4 faculty assists
        - Four 4th years on day Y, with 4 faculty assists
        - Four 3rd years on day X, with 1 faculty and four 4th years
        - Four 3rd years on day Y, with 1 faculty and four 4th years
    - 01/2024 Simulation #2 (1 hour each)
        - Four 4th years on day X, with 4 faculty assists
        - Four 4th years on day Y, with 4 faculty assists
        - Four 3rd years on day X, with 1 faculty and four 4th years
        - Four 3rd years on day Y, with 1 faculty and four 4th years
    - 03/2024 Simulation #3 (1 hour each)
        - Four 4th years on day X, with 4 faculty assists
        - Four 4th years on day Y, with 4 faculty assists
        - Four 3rd years on day X, with 1 faculty and four 4th years
        - Four 3rd years on day Y, with 1 faculty and four 4th years
    - 07/2024
        - Analysis of confidence/procedural steps surveys from preintervention to post (Survey A1 and Survey A2)

        - Analysis of confidence surveys from post intervention to graduates (Survey A1, Survey A2 and Survey B)
        - After each TVH/LAVH in OR, 3rd and 4th year residents will complete Survey A1
    - 11/2024 Simulation #1 (2 hours each)
        - Four 4th years on day X, with 4 faculty assists
        - Four 4th years on day Y, with 4 faculty assists
        - Four 3rd years on day X, with 1 faculty and four 4th years
        - Four 3rd years on day Y, with 1 faculty and four 4th years
    - 01/2025 Simulation #2 (1 hour each)
        - Four 4th years on day X, with 4 faculty assists
        - Four 4th years on day Y, with 4 faculty assists
        - Four 3rd years on day X, with 1 faculty and four 4th years
        - Four 3rd years on day Y, with 1 faculty and four 4th years
    - 03/2025 Simulation #3 (1 hour each)
        - Four 4th years on day X, with 4 faculty assists
        - Four 4th years on day Y, with 4 faculty assists
        - Four 3rd years on day X, with 1 faculty and four 4th years
        - Four 3rd years on day Y, with 1 faculty and four 4th years
    - 07/2025
        - Analysis of confidence/procedural steps surveys from preintervention to post (Survey A1 and Survey A2)
        - Analysis of confidence surveys from post intervention to graduates (Survey A1, Survey A2 and Survey B)
        - Analysis of change in TVH number by residents (ACGME #)
        - Analysis of change in TVH numbers by department

Time line Part B

- 07/2021
  - Analysis of confidence/procedural steps surveys from preintervention to post (Survey A1 and Survey A2)
  - Send out Survey B to graduates from the last 6 years
    - continue surveying each successive graduating class annually for the next four years (Survey B)
- 07/2022
  - Analysis of confidence surveys from post intervention to graduates (Survey A1, Survey A2 and Survey B)
  - Send out Survey B to graduates from the last 7 years
    - continue surveying each successive graduating class annually for the next three years (Survey B)
- 07/2023
  - Analysis of confidence surveys from post intervention to graduates (Survey A1, Survey A2 and Survey B)
  - Send out Survey B to graduates from the last 8 years
    - continue surveying each successive graduating class annually for the next two years (Survey B)
- 07/2024
  - Analysis of confidence surveys from post intervention to graduates (Survey A1, Survey A2 and Survey B)
  - Send out Survey B to graduates from the last 9 years
    - continue surveying each successive graduating class annually for the next one year (Survey B)
- 07/2025
  - Analysis of confidence surveys from post intervention to graduates (Survey A1, Survey A2 and Survey B)
  - Send out Survey B to graduates from the last 10 years
  - Analysis of change in TVH numbers by Survey B

Time line Part C

- 06/2022 Offer low cost CME "Tips and Tricks for TVH" refresher course to local/regional OB/Gyns
    - Offer MIGS/Gyn Onc/Urogyn faculty
    - Do Simulation #1
    - Follow with TVH on cadaver
    - Invite participants to fill out Survey B annually
- 06/2023 Offer low cost CME "Tips and Tricks for TVH" refresher course to local/regional OB/Gyns
    - Offer MIGS/Gyn Onc/Urogyn faculty
    - Do Simulation #1
    - Follow with TVH on cadaver
    - Invite participants to fill out Survey B annually
- 06/2024 Offer low cost CME "Tips and Tricks for TVH" refresher course to local/regional OB/Gyns
    - Offer MIGS/Gyn Onc/Urogyn faculty
    - Do Simulation #1
    - Follow with TVH on cadaver
    - Invite participants to fill out Survey B annually
- 06/2025 Offer low cost CME "Tips and Tricks for TVH" refresher course to local/regional OB/Gyns
    - Offer MIGS/Gyn Onc/Urogyn faculty
    - Do Simulation #1
    - Follow with TVH on cadaver
    - Invite participants to fill out Survey B annually
- 07/2025
    - Analysis of change in TVH numbers by Survey B

Survey A1

(anonymous, google/survey monkey)

Please check all steps that you performed independently & successfully:

- □ Positioned patient
- □ Preoperative examination
- □ Demonstrated uterine descent
- □ Made initial incision at cervicovaginal junction
- □ Developed plane between the bladder and the anterior cervix
- □ Entered peritoneum anteriorly
- □ Entered peritoneum posteriorly
- □ Palpated uterosacral and cardinal ligaments
- □ Clamped, cut and ligated (or sealed and transected) uterosacral and cardinal ligaments
- □ Visualized uterine vessels
- □ Clamped, cut and ligated (or sealed and transected) uterine vessels
- □ Clamped, cut and ligated (or sealed and transected) triple pedicle
- □ Delivered the uterus
- □ Examined for hemostasis, evaluating pedicles in a systematic fashion
- □ Closed the vaginal cuff
- □ Incorporated uterosacral ligaments into cuff closure

PGY:

How many times have you done the TVH simulation?

How many times have you assisted on the TVH simulation?

Rate your confidence in performing TVH independently:

0 5 10

Not confident at all Independent surgeon

Survey A2

(anonymous, on paper, hand in after sim with sim eval)

PGY:

How many times have you done this simulation?

How many times have you assisted on this simulation?

Rate your confidence in performing TVH independently:

0 5 10

Not confident at all Independent surgeon

Survey B

I have been out of training for ___ years:
0
1-3
4-6
7-9
9-12
13-15
>15

In the last 12 months I have performed ___ TVH/LAVH** in the last year:
0
1-3
4-6
7-9
9-12
13-15
>15

Rate your confidence in performing TVH independently:

0 5 10
Not confident at all Independent surgeon

**For the purposes of this survey, LAVH means making colpotomy, taking uterosacral ligaments, cardinal ligaments and uterine arteries vaginally.