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Emily N. Schneider

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Emily Schneider, MD
Division of Family Planning
Department of Obstetrics and Gynecology
Master of Science in Clinical Research (MSCR) Candidate
CTSC MSCR BioMedical Informatics Level 2 Course with Jonathan D. Eldredge, PhD
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Literature search strategy for pain management during in-office hysteroscopic sterilization

MeSH search terms: Hysteroscopy, Sterilization, Acute Pain, Pain Management, Pain Perception, Analgesics, Anesthesia.

Introduction

Permanent contraception is the leading form of birth control used by women in the United States (1). Three approaches are used to achieve female permanent contraception: mini-laparotomy, laparoscopy, and transcervical operative hysteroscopy. The latter approach involves placement of a small camera device through the cervix and into the uterus to deploy the Essure[®] Permanent Birth Control System (Bayer Healthcare Pharmaceuticals, Whippany, NJ) device into each fallopian tube to induce tubal occlusion. Essure[®] permanent contraception is offered in the office or in the operating room. Advantages of in-office Essure include lower costs (2-4), faster recovery and less morbidity with avoidance of abdominal incisions and general anesthesia (5), and the rare but serious complications associated with laparoscopy and mini-laparotomy (6).

A challenge of in-office Essure[®] is ensuring adequate pain control (7). Although hysteroscopic permanent contraception can be tolerated in the outpatient setting, it is still a painful procedure. Two studies have evaluated the use of narcotic interventions to decrease pain during the in-office procedure, but the findings did not result in reduction of pain (8, 9). Additionally, sedation with narcotics requires patients to have a ride home following the procedure due to the prolonged effects of neurosensory impairment. A novel approach to pain management during this in-office procedure is to use inhaled nitrous oxide (NO), which has analgesic, anxiolytic, and amnestic properties when used during short painful procedures (10, 11). Advantages of NO include rapid onset and reversal with minimal side effects and few contraindications (12, 13). The use of NO is extremely safe in a wide range of disciplinary and clinical contexts administered by various medical personnel when administered with an active vacuum scavenging system to minimize exposure to clinic staff (14, 15). This research study will determine if inhaled nitrous oxide can be used as a novel approach as effective sedation for in-office hysteroscopic sterilization.

Research Question

To measure the difference in maximum pain using a 100mm visual analogue scale (VAS) experienced during in-office transcervical permanent contraception for women receiving either inhaled nitrous oxide or standard oral analgesia (hydrocodone/acetaminophen and lorazepam) with inhaled oxygen.

We hypothesize that inhaled nitrous oxide will reduce the maximum pain experienced more than standard oral medications in women undergoing in-office transcervical permanent contraception.

Replicable Search Strategy

For the literature search process for this study I queried PubMed™ and Web of Knowledge. I also performed a hand search of the journal *Contraception*, an international reproductive health journal. I reviewed each article title from the date of January 2000 to the most current issue August 2014. And, finally, I reviewed published abstracts for oral and poster presentations presented at the Society of Family Planning Forum and Association of Reproductive Health Professionals annual conferences from the year 2000 and beyond. I did not select references to articles published or presentations made prior to the year 2000 as the Essure® permanent contraception device was introduced into the international market in the year 2001 and subsequently in 2002 in the United States.

PubMed Search

The first PubMed search strategy began on July 11, 2014 and involved the MeSH database in PubMed. I eventually performed an iterative search process to retrieve the most relevant articles related to the search topic in PubMed. The search for pain management during outpatient hysteroscopic sterilization was thought of in two frameworks: the hysteroscopic procedure, which is an operative technique with surgical interventions performed, and the pain control during the procedure. Initial creation of the search strategy was to identify MeSH terms from two known published papers in this research area in PubMed (8, 9). The goal of the search was to maximize specificity of finding relevant articles in the initial search by use of MeSH terms while maintaining sufficient sensitivity of the operative procedure by using transcervical sterilization with the Essure® device in the strategy.

Using the MeSH database in PubMed, accessed at <http://www.ncbi.nlm.nih.gov/mesh>, the following MeSH search terms were included for the procedure: Hysteroscopy and Sterilization, reproductive. The addition of both transcerv* and Essure* as search terms is to increase the sensitivity of the search articles retrieved with this strategy. For the pain control portion, the following MeSH terms were used: Acute pain; Analgesics; Pain management; Pain perception; Anesthesia; Pain measurement.

The search started on July 11, 2014 by entering “Hysteroscopy” into the search bar in the MeSH database followed by the enter key. I selected the radio button “Add to search builder”. Then I typed “Sterilization, reproductive into the search bar followed by the enter key. I changed the Boolean operator to OR and Add to search builder was clicked. Now in the PubMed Search Builder textbox I typed “OR transcerv*[tw] OR Essure*[tw]” into the textbox to add to the previous search terms already created. Then I selected the Search PubMed radio button. These steps built the search strategy that relates to the procedure type that we are investigating.

The second part of this initial search strategy was to build the pain management aspects associated with the procedure. A new search was started on the MeSH homepage by typing “Acute pain” into the search bar followed by the enter key. Then I selected the Acute Pain hyperlink and then I clicked on the “Add to search builder” radio button. Next I typed in “Analgesics” into search bar followed by pressing the enter key. I clicked on the Analgesics hyperlink and I changed the Boolean operator to OR. Next I selected the “Add to search builder” radio button Next I typed “Pain Management” into search bar, again changed the

Boolean operator to OR and selected the “Add to search builder” radio button. I added the MeSH terms “Pain Perception” and “Pain Measurement” to the search by following the same steps used to add “Pain Management”. I added the MeSH term “Anesthesia” by following the same steps used to add “Analgesics” because of the hyperlink. Lastly, I selected the Search PubMed radio button.

The next step was to combine the two components of this search strategy. References are displayed after selecting Search PubMed. I selected the “Advanced link” located at the top of the page. I selected the hyperlink Add located next to the first search component. Then I selected the Add hyperlink located next to the second search component. I chose the AND Boolean operator followed by clicking on the Search radio button. To refine the search, I used the following filters on the left side of the screen: Humans under Species and English under Languages. If these are not present, the show additional filters needs to be clicked to select Species and Languages. Then the Show button is clicked to make the filters appear.

I selected the OR Boolean operator to connect terms related to either aspect of the procedure being searched and I used the AND Boolean operator to combine the two search strategies for the combination of the procedure with pain control. On July 11, 2014 my PubMed search with Humans and English language filters produced:

Search (((("Hysteroscopy"[Mesh]) OR "Sterilization, Reproductive"[Mesh] OR transcerv*[tw] OR Essure*[tw])) AND ((((((("Acute Pain"[Mesh]) OR "Analgesics"[Mesh]) OR "Pain Management"[Mesh]) OR "Pain Perception"[Mesh]) OR "Anesthesia"[Mesh]) OR "Pain Measurement"[Mesh]) AND Humans[Mesh] AND English[lang]))	653
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In the subsequent days I reviewed the titles for the 653 article references retrieved from the in the initial search strategy and identified items to be included or excluded for further investigation. The goal of the initial inspection was to identify articles that involved pain interventions or techniques to reduce pain during in-office operative hysteroscopy. The Essure[®] device was introduced into the European market in 2001 and in the United States in 2002. Still, I included pain interventions for other hysteroscopic operative procedures as they may apply to pain management during hysteroscopic sterilization.

Inclusion criteria of article reference related to three concepts that pertain to the hysteroscopic procedure in question: patients, anesthesia type, and procedure type. Included patient characteristics were: patient perception, patient satisfaction, or obese patients. Included anesthetic types were: local cervical anesthesia or intravenous pain control. Included procedure types were: office hysteroscopy, learning curve of hysteroscopic procedure, cervical priming for hysteroscopic procedure, saline use as distension media during hysteroscopic procedure, outpatient setting, or general hysteroscopy procedures.

Exclusion criteria of article references related to patient characteristics, anesthesia type, procedure type, and miscellaneous criteria. Excluded patient characteristics were: infertility patients, postmenopausal women, or chronic pain patients. Excluded anesthesia types were: general anesthesia, spinal anesthesia, post-operative anesthesia care or complications, intraperitoneal anesthesia, cost analysis, or obstetrical anesthesia. Excluded procedures as they are not considered operative hysteroscopy were: IUD insertions, cesarean sections, postpartum tubal ligations, laparoscopic tubal ligations, complications of hysteroscopy, vasectomy, mini laparotomy tubal ligations, hysterectomy, ultrasound or saline infused sonography, tubal re-anastomosis, dilation and curettage, Pipelle biopsy of the uterus, chorionic villous sampling, or non-

GYN procedures. Miscellaneous categories excluded are: cost analysis study, types of hysteroscopes, or sterilization reviews.

Evaluation of retrieved article reference titles identified 125 as possibly relevant to the search topic. Investigation of the abstracts to ascertain further relevance employed the following inclusion and exclusion criteria. Inclusion criteria were: operative hysteroscopy with uterine interventions and pain interventions. Exclusion criteria were: diagnostic hysteroscopy, techniques of vaginoscopy, no pain interventions, operating room procedures, laparoscopy, pre or post procedure pain assessment without during procedure pain assessment, infertility patients, vasectomy, complications of hysteroscopy or difference types of hysteroscopes not used in transcervical sterilization, or commentary on articles.

Review of article reference abstracts identified 32 possible article references that relate to the search topic of pain interventions during operative hysteroscopy. One review article for the above inclusion and exclusion criteria identified 21 article references retrieved pertaining to the search topic. (8, 9, 16-34). Further exclusion of articles based on postmenopausal women patient population, diagnostic hysteroscopy without uterine intervention, or no anesthesia given to the patients prior to or during hysteroscopy. These final selected 21 articles were now considered to be the gold standard of this search strategy. Attempts to identify inclusion and exclusion criteria in the MeSH terms of the 21 articles to further define our initial search strategy as I had to eliminate hundreds of irrelevant articles. Evaluation of the MeSH terms for inclusion criteria: Premenopause, Office visits, or Pain threshold. Exclusion MeSH terms: Obstetrical, Laparoscopic, Vasectomy, Involuntary sterilization, Infertility, or Menopause. An iterative process was used within the MeSH database adding these various MeSH terms to the initial search strategy. For each search there was evaluation of the article references retrieved to identify if the 21 gold standard articles were still present or removed. Addition of the inclusion MeSH terms one by one to the search strategy was too restrictive with only 4 to 10 of the gold standard articles retrieved in the searches. There was more success eliminating irrelevant article reference titles by using the exclusion MeSH terms Obstetrics, Menopause, Laparoscopy, Vasectomy, and Infertility. This revised approach maintained the 21 gold standard articles reference titles.

To add these exclusion criteria to the initial search, I accessed the MeSH database homepage. I typed "Obstetrics" into the search bar followed by the enter key. Next I selected the Obstetrics hyperlink and added to the search by selecting "Add to search builder". I then typed "Menopause" into the search bar followed by enter. I changed the Boolean operator to OR and clicked on "Add to search builder". Next I typed "Vasectomy" into the search bar followed by the enter key. I clicked on the Vasectomy hyperlink and changed the Boolean operator to OR. I then added to the search by selecting "Add to search builder". I added the MeSH terms "Laparoscopy" and "Infertility" to the search by following the same steps to add "Vasectomy" as they both had hyperlinks. Next I selected the Search PubMed radio button. I then selected the Advanced page in the MeSH database and selected the Add hyperlink which is located next to the initial search strategy. To incorporate the exclusion criteria to the search I changed the Boolean operator to NOT followed by clicking on the Add hyperlink located next to the search strategy that comprises the exclusion terms previously created. Finally I selected the Search radio button. On August 9, 2014 this search returned 344 article reference titles, about half of my previous searches.

Search (((((((("Hysteroscopy"[Mesh]) OR "Sterilization, Reproductive"[Mesh]OR transcerv*[tw] OR Essure*[tw])) AND (((((((("Acute Pain"[Mesh]) OR "Analgesics"[Mesh]) OR "Pain Management"[Mesh]) OR "Pain Perception"[Mesh]) OR "Anesthesia"[Mesh]) OR "Pain Measurement"[Mesh]))) NOT (((((((("Obstetrics"[Mesh]) OR "Menopause"[Mesh]) OR "Laparoscopy"[Mesh]) OR "Vasectomy"[Mesh]) OR "Infertility"[Mesh]) AND Humans[Mesh] AND English[lang])

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The year 2000 is the publication date of the last notable article retrieved. This corresponds to the technology of in-office operative hysteroscopy becoming popular in the United States. If the search is limited to publications from the year 2000 and beyond, the search returns 165 article reference titles on August 9, 2014.

Search (((((((("Hysteroscopy"[Mesh]) OR "Sterilization, Reproductive"[Mesh]OR transcerv*[tw] OR Essure*[tw])) AND (((((((("Acute Pain"[Mesh]) OR "Analgesics"[Mesh]) OR "Pain Management"[Mesh]) OR "Pain Perception"[Mesh]) OR "Anesthesia"[Mesh]) OR "Pain Measurement"[Mesh]))) NOT (((((((("Obstetrics"[Mesh]) OR "Menopause"[Mesh]) OR "Laparoscopy"[Mesh]) OR "Vasectomy"[Mesh]) OR "Infertility"[Mesh]) AND Humans[Mesh] AND English[lang]) Sort by: **PublicationDate** Filters: **Publication date from 2000/01/01 to 2014/12/31; Humans; English**

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Web of Science

The next step in this search strategy was to identify additional relevant articles to our search topic not retrieved by PubMed. This was accomplished by use of the Web of Science database to find citations to the 21 gold standard articles since their publication. Access to this database was through the University of New Mexico Health Sciences Library and Informatics Center (HSLIC) webpage at <http://hslic.unm.edu/>. On the Web of Knowledge homepage Add Another Field was clicked. The next step was to select the Title and Year Published from the drop down menus for search criteria and the Boolean operator set at AND. Once each article title and publication date was entered, the Search tab was selected. Once the correct article reference was identified the "Times Cited" hyperlink was selected, which is listed on the right hand side of the article reference. This displayed the article references for review. Relevant articles were identified by using similar methodology to the PubMed search for both reference titles and abstracts. If the reference met inclusion criteria through this process, the article was reviewed. By searching these 21 gold standard references I found an additional 2 articles that were not identified in during the PubMed search (35, 36).

Grey Literature Search

The Society of Family Planning and the Association of Reproductive Health Professionals are two professional societies that hold conferences each year that include oral and poster presentations to further advance care in reproductive health services. I reviewed all abstracts from the year 2000 to 2014 for possible relevant items as they pertain to our search of pain control during operative hysteroscopy. The abstracts were accessed through medical journal *Contraception*. This international reproductive health journal is the official journal of the Society of Family Planning and the Association of Reproductive

Health Professionals. No additional papers or posters were found that pertain to our search topic. Additionally, a hand search of each issue of the *Contraception* journal from January 2000 to the most current issue of August 2014 found no further relevant articles. The start date of the search relates to when the Essure[®] permanent contraception system device started being used in a clinical setting.

Evaluation of References

Combining the PubMed and Web of Science searches there are 23 articles that are relevant to the search topic of pain management during in-office hysteroscopy. To further search for any more relevant articles, a hand search of the reference titles of the 23 articles found were reviewed. If the title was applicable, the abstract was reviewed. I applied the same inclusion and exclusion criteria used during the PubMed search to identify relevant article references. This approach identified 5 articles to be possibly relevant based on the title and abstract. The 5 articles were excluded during evaluation of the full article as the article either included diagnostic hysteroscopic procedures or no pain intervention during the procedure was evaluated. Thus, this review of references for the 23 articles does not yield any additional articles.

Summary

Searching two databases, PubMed and Web of Science, using the aforementioned search strategies followed by applying the exclusion and inclusion criteria produced 23 article references that involved anesthesia with operative hysteroscopy. Some of the articles are specific to hysteroscopic transcervical sterilization. Additionally, a grey literature search of the journal *Contraception* and review of abstracts from reproductive health and family planning conferences found no additional relevant presented papers or posters on the search topic. This search strategy maximizes specificity of relevant article references retrieved while maintaining sufficient sensitivity to the specific operative hysteroscopic procedure of transcervical sterilization with the Essure[®] device.

The use of this search strategy gives background research towards my hypothesis of pain management during in-office hysteroscopic sterilization procedure. There is limited existing literature to support a standard pain approach during the procedure. Study of this novel application of inhaled nitrous will possibly improve access for patients who choose to undergo tubal sterilization in the office setting.

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