The Family Medicine Residency Training Initiative in Miscarriage Management:

Impact on Practice in Washington State

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BACKGROUND AND OBJECTIVES: Non-complicated spontaneous abortion cases should be counseled about the full range of management approaches, including uterine evacuation using manual vacuum aspiration (MVA). The Residency Training Initiative in Miscarriage Management (RTI-MM) is an intensive, multidimensional intervention designed to facilitate implementation of office-based management of spontaneous abortion using MVA in family medicine residency settings. The purpose of this study was to test the impact of the RTI-MM on self-reported use of MVA for management of spontaneous abortion.

METHODS: We used a pretest/posttest one group study design and a web-based, anonymous survey to collect data on knowledge, attitudes, perceived barriers, and practice of office-based management of spontaneous abortion. We used multivariable models to estimate incident relative risks and accounted for data clustering at the residency site level.

RESULTS: Our sample included 441 residents and faculty from 10 family medicine residency sites. Our findings show a positive association between the RTI-MM and self-reported use of MVA for management of spontaneous abortion (adjusted RR=9.11 [CI=4.20–19.78]) and were robust to model specification. Male gender, doing any type of management of spontaneous abortion (eg, expectant, medication), other on-site reproductive health training interventions, and support staff knowledge scores were also significant correlates of physician practice of MVA.

CONCLUSIONS: Our findings suggest that the RTI-MM was successful in influencing the practice of management of spontaneous abortion using MVA in this population and that support staff knowledge may impact physician practice. Integrating MVA into family medicine settings would potentially improve access to evidence-based, comprehensive care for women.

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About 15% of recognized pregnancies end in miscarriage or spontaneous abortion;[1,2] the proportion increases with the sensitivity of pregnancy diagnosis to a range of 20%–62%. Using a conservative incidence estimate of 10%, there may be half a million spontaneous abortions each year in the United States.[3] Comprehensive women's health care includes access to office-based uterine evacuation for spontaneous abortion.[4] Integrating office-based management of spontaneous abortion using manual vacuum aspiration (MVA) into family medicine settings has the potential to improve access to comprehensive women's health care and the quality of and satisfaction with care that women receive from their primary care providers.[5]

Concerns about hemorrhage and infection, which can both occur with spontaneous abortion, have driven current practice for management of spontaneous abortion in the operating room.[4,6] Physician preference may also play a role.[4] Available data[7-10] indicate that operating room-based surgery is still the default management strategy, although population-based data are lacking. Alternative management strategies are expectant (wait and see), medication (misoprostol), and office-based management via manual vacuum aspiration (MVA).[11] MVA is as safe as operating room-based care in samples of women presenting with spontaneous abortion[2] and seeking

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induced abortion[12,13] may improve patient satisfaction with care[1,4] and avoids overtreatment, including the risks associated with general anesthesia. Office-based MVA results in significant time and cost savings compared to operating room-based management.[1,3,14] Clinical evidence clearly indicates that non-complicated spontaneous abortion cases should be counseled about the full range of treatment approaches, including expectant, medication, office-based MVA, and operating room management.[4,15,16]

Family medicine residents are not routinely trained in office-based uterine aspiration for spontaneous abortion,[5] despite recommendations that residents who plan to practice in areas without easy access to obstetrician/gynecologists learn this skill.[17] In Washington State, family physicians are more likely to practice in areas that are rural, have a large proportion of minority and poor residents, or are experiencing health professions shortages.[18] Office-based management of spontaneous abortion is within the scope of family medicine practice,[19] allows family physicians to provide comprehensive care to female patients, and requires intrauterine procedural skills many family physicians already have.[17] The skills learned for MVA management of spontaneous abortion can be translated to other procedures: uterine hemorrhage, IUD insertion, endometrial biopsies, and induced abortion. Training family physicians to perform MVA in an office setting has the potential to expand access to this procedure, especially for underserved women, and reduce costs. The Residency Training Initiative in Miscarriage Management (RTI-MM) intervention was aimed at family medicine residents, faculty, and key clinical and administrative support staff at all 10 non-military family medicine residency programs in the State of Washington. The RTI-MM is designed to facilitate implementation of office-based management of spontaneous abortion, with a focus on manual vacuum aspiration, in family medicine residency settings. The extensive literature on practice change suggests that passive approaches are ineffective[20,21] but highlight that interactive and mixed (passive and interactive) and multi-level (individual and team) approaches can impact practice.[20,22] Clinical evidence is necessary but not sufficient for practice change to occur,[23] and interventions must also address barriers and facilitators to change.[22] Research to date points to the importance of tailored interventions,[22,24] attention to context,[23,24] and commitment to change from the target population, opinion leaders, and the organization.[23,25] Systems change approaches[26] that explicitly acknowledge the need for comprehensive strategies to target multiple levels within a system to achieve change[22] have also demonstrated success. Development of the RTI-MM was guided by the practice change literature; it combines passive and interactive sessions and outreach visits, adopts individual and team approaches, addresses barriers and facilitators to change through participant feedback and stakeholder input, is tailored to family medicine practices, and seeks commitment from opinion leaders and champions.[23]

Individual residency sites recruited training intervention participants; sites were encouraged to invite as many faculty, residents, and support staff as possible. Some sites selected a core team who would be involved in miscarriage procedures while other sites chose to include as many people as possible. The RTI-MM intervention includes a didactic session, a hands-on papaya workshop,[27] and participatory discussion. The didactic session is a comprehensive treatment of miscarriage management (medication and office-based surgical management using MVA); the hands-on session includes a papaya workshop to practice MVA technique. Participants use MVA equipment on a ripe papaya, which mimics the uterus and allows participants to practice uterine aspiration. The papaya model has the advantages of being low-tech and relatively easy to implement and permits participants to empty the contents of the uterus (papaya seeds and fruit), which plastic pelvic models do not.[27] The participatory discussion session is focused on systems change and includes values clarification and "hopes and hesitations" where participants are invited to share hopes and hesitations or perceived barriers to implementing miscarriage management with MVA in their settings.

This pretest/posttest one group evaluation study[28] assessed the association of the RTI-MM with changes in self-reported use of MVA for management of spontaneous abortion.

Methods

The Family Medicine Residency Network (FMRN), a coordinating organization of the family medicine residency sites in Washington State, provided the sample denominator and contacted potential study participants at both baseline and follow-up. An email cover letter explained the purpose of the research and contained a link to a web-based survey. All survey data were fully anonymous; baseline and follow-up surveys were not linked. Baseline data were collected at one time point for all individuals at all sites prior to the RTI-MM training intervention. The RTI-MM was implemented over 2 years; follow-up email recruitment targeted program participants at each site 6 months after the intervention at the site.

Measures include demographics and an investigator-developed Knowledge, Attitudes, and Practice (KAP) survey. At the time of this study, no measure existed to measure knowledge, attitudes, and practice of spontaneous abortion management in family medicine settings. The KAP survey was developed by the study team and is based on the literature in management of spontaneous abortion,[10] contraceptive technologies, and women's health in family medicine.[29,30] The KAP survey was refined to improve

face validity after expert input from OB-GYN and family medicine physicians and pilot-testing with one physician and five nonphysicians. Additional site-level variables come from the FMRN (eg, religious affiliations of hospital sites, other training activities currently in place). This study was approved by the University of Washington Human Subjects Division.

Our primary outcome is self reported practice of management of spontaneous abortion using MVA, a binary response to the question "Do you currently offer outpatient miscarriage management using MVA?" The key independent variable is the RTI-MM intervention. We assessed intervention effect as a binary (baseline versus follow-up) and as a categorical (baseline versus reported attending a training or not at follow-up) variable. The categorical treatment variable captures RTI-MM dose and allows us to see site-level or diffusion effects versus individual-level changes associated with the RTI-MM.

Other covariates include role (resident/faculty), gender, doing any management of spontaneous abortion (eg, expectant or medication), knowledge, attitudes, and perceived barriers scores of both physicians and support staff at the physician's residency site, and whether the site participates in the RHEDI program[30] (a program that includes MVA training for induced abortion). The doing any miscarriage variable is intended to isolate change in MVA practice by controlling for predisposition to manage spontaneous abortion at all and other management patterns. Knowledge is measured using a summary score that includes a set of true/false and multiple choice items and nine patient scenarios, where respondents are asked to indicate if MVA and/or medication management would be appropriate for a given type of patient. We assigned individual physicians the site level mean clinical and administrative support staff knowledge, attitudes, and perceived barriers scores at follow-up to test the impact of support staff views about implementing MVA for miscarriage on physician practice. We controlled for testing effects with a dummy indicator of whether at follow-up a respondent reported completing the baseline survey.

We used descriptive statistics to characterize the sample and examined bivariate relationships between our outcome and key variables. We used *t* tests to assess differences between baseline and follow-up sample characteristics and summary knowledge, attitudes, and perceived barriers scores and individual items. We used a multivariable "modified Poisson"[31] generalized linear model (GLM) to test the association of the RTI-MM and self-reported use of MVA among physicians. A modified Poisson approach for binary outcomes allows us to estimate relative risks (RR) instead of odds ratios (OR)[31,32] and produces reliable RRs and confidence intervals (CI).[33] Observations from the same site may be correlated; we accounted for data clustering at the site level.[34] We estimated two models for the intervention effect: (1) binary and (2) dose-response. We performed sensitivity analyses by varying model specifications, tested for interactions, and assessed model fits by examining residuals. All analyses were conducted using Stata10 (Version 10.0., College Station, TX: StataCorp LP, 2010).

Results

Our sample included 441 residents and faculty from the 10 family medicine residency sites. At follow-up, the sample was significantly more likely to be from a RHEDI site (two of the 10 sites were RHEDI sites), report doing any miscarriage management, and report using MVA for miscarriage management. We do not have individual-level linked data and therefore cannot assess loss to follow-up, but the follow-up sample is smaller than the baseline sample, and we can determine overlap at follow-up. Some loss to follow-up occurred through resident graduation (third-year residents at the time of the baseline survey were lost to follow-up). We had a good response rate at both baseline (75%) and follow-up (69%), especially in a clinician sample.[35,36] Table 1 describes the sample characteristics.

Table 2 depicts summary knowledge, attitudes, and perceived barriers scores and highlights individual items that showed significant change over time. Overall, knowledge and attitudes scores increased slightly post-RTI-MM, and perceived barriers to implementing MVA for SAB decreased slightly. However, significant change was not observed on all scale items.

In bivariate analyses (not shown), RTI-MM training was strongly associated with reporting use of MVA for SAB management (RR=17.88, CI= 7.5–42.44), accounting for data clustering at the site level. In the fully adjusted model (Table 3), the relative risk remained large and significant (RR=9.11, CI=4.20–19.78). Significant covariates positively associated with MVA practice include male gender, doing any type of spontaneous abortion management, being at a RHEDI site, physician attitudes, and support staff knowledge, attitudes, and perceived barriers. Higher perceived barriers among physicians were negatively correlated with the outcome and statistically significant in one model but the effect was small. RHEDI site status appears to modify the effects of gender; male gender is positively associated with using MVA for SAB, as is being from a RHEDI site, but the interaction of gender and RHEDI site is negatively associated with the outcome, indicating that the difference between genders does not exist at RHEDI sites. Physician knowledge was not associated with self-reported MVA practice.

There is evidence to suggest a dose-response or diffusion effect (model 2): those who reported attending a training were most likely to report MVA practice compared to baseline (RR=9.62 (4.52–20.48), but those who reported not attending a training were still more likely

Table 1: Sample Characteristics: Physician Residents and Faculty*

n (%)	Baseline (n=277)	Follow-up (n=166)
Residents	183 (66)	103 (62)
Female	157 (57)	96 (58)
At a RHEDI site?**	40 (14)	38 (23)
Doing any miscarriage management***	119 (43)	101 (60)
Using MVA for miscarriage management***	7 (3)	76 (46)
Reported completing baseline survey	—	106 (63)
Reported attending RTI-MM session	—	144 (86)

* n=443
** $P<.05$
*** $P<.001$ for two-sample t test difference between baseline and follow-up
RHEDI—Reproductive Health Education in Family Medicine
RTI-MM—Residency Training Initiative in Miscarriage Management

Table 2: Knowledge, Attitudes, and Barriers: Summary Scores and Select Individual Items

	Mean Scores (SD)	
Summary scores	**Baseline**	**Follow-up**
Knowledge		
True/false, multiple choice items (nine possible)	7.7 (1.1)	8.2 (0.9)***
Patient scenario score (27 possible)	23.4 (1.8)	22.9 (3.1) *
Attitudes (15 items, 75 possible; higher score indicates more positive attitude)	56.2 (6.6)	60.4 (7.7) ***
Barriers (19 items; 95 possible; higher score indicates more perceived barriers)	58.0 (9.7)	55.0 (11.8) **
Select individual items that showed significant change		
Knowledge; proportion answering correctly		
Patient satisfaction is highest when women are offered all treatment options	.80	.99***
I am aware of an oral pain regimen for miscarriage management	.73	.95***
Attitudes: Likert scale, 5=strongly agree		
MVA is appropriate for MM	4.0	4.4***
Nursing staff support MM via MVA	3.4	3.8***
MVA will save time for me and my patients	3.7	4.0***
Women experiencing SAB can tolerate MVA with local anesthesia	3.9	4.2***
MVA requires skills similar to those I already have	3.5	4.1***
Barriers: Likert scale, 5=strongly agree		
Equipment not available	3.6	3.1***
Lack of residency policy/philosophy on office-based MM	3.1	2.7***

*$P<.05$, **$P< .01$, ***$P<.001$ for difference between baseline and follow-up
SAB—spontaneous abortion, MM—miscarriage management, MVA—manual vacuum aspiration

to report MVA practice than those at baseline (RR=6.72; CI=2.31–19.55).

We stratified by RHEDI site status to assess differences in RTI-MM intervention effects (model not shown). The RTI-MM effect was stronger in the subsample of RHEDI observations (n=78, RR=11.6, CI=2.75–49.22) than in the sample of non-RHEDI observations (n=363, RR=7.3, CI=2.77–19.34), and the effect of gender disappeared among the RHEDI observations, consistent with our gender and RHEDI interaction results, above. Support staff at RHEDI sites have higher knowledge and perceive fewer barriers to implementation than at other sites.

Individual residency site does not appear to be an independent driver of implementing MVA; in a model where we directly modeled individual site dummy variables or site fixed effects (data not shown), we used

Table 3: Associations With Self-Reported MVA Practice*

	GLM Modified Poisson Models (RR, CI)	
	Model 1	**Model 2**
Intervention: RTI-MM		
Binary: follow-up	9.11 (4.20–19.78), *P*<.001	—
Categorical (baseline is referent group)		
Follow-up, reported not attending a RTI-MM training	—	6.72 (2.31–19.55), *P*<.001
Follow-up, reported attending a RTI-MM training	—	9.62 (4.52–20.48); *P*<.001
Covariates		
Resident (versus faculty)	1.06 (.67–1.66)	1.04 (.68–1.60)
Male gender	1.44 (1.15–1.81), *P*=.001	1.44 (1.16–1.80), *P*=.001
RHEDI site?	1.87 (1.58–2.23), *P*<.001	1.91 (1.57–2.34), *P*<.001
Gender RHEDI interaction	0.77 (.59–1.00), *P*=.05	0.73 (.51–1.03), *P*=.08
Follow-up respondent completed baseline survey	1.59 (1.00–2.54), *P*=.05	1.57 (1.01–2.46), *P*=.05
Doing any type of MM	3.16 (1.85–5.38), *P*<.001	3.11 (1.83–5.30), *P*<.001
Knowledge score	.99 (.98–1.01)	.99 (.98–1.00)
Attitudes score	1.03 (1.00–1.06), *P*=.03	1.03 (1.00–1.06), *P*=.04
Barriers score	0.99 (.98–1.0), *P*=.03	0.99 (.98–1.0), *P*=.06
Support staff knowledge (site mean at follow-up)	1.60 (1.36–1.88), *P*<.001	1.63 (1.39–1.91), *P*<.001
Support staff attitudes (site mean at follow-up)	1.03 (1.01–1.06), *P*=.01	1.03 (1.01–1.06), *P*=.004
Support staff barriers (site mean at follow up)	1.14 (1.10–1.18), *P*<.001	1.14 (1.10–1.18), *P*<.001

* Multivariable regression results (n=441 for all models)
MVA—manual vacuum aspiration
RTI-MM— Residency Training Initiative in Miscarriage Management
RHEDI—Reproductive Health Education in Family Medicine

the median outcome as the referent group (each site compared to the site with the median proportion of self-reported MVA practice), and only one site was an independent correlate of MVA practice.

Discussion

We report a positive, robust association of the RTI-MM intervention with self-reported use of MVA to manage spontaneous abortion. Our findings suggest that the RTI-MM was successful in influencing practice patterns for management of spontaneous abortion using MVA in this population of family medicine faculty and residents. Further, we were able to isolate impacts on use of MVA from a proclivity to manage spontaneous abortion using any technique; other technique was a strong correlate of use of MVA, but the RTI-MM retained an independent impact. We also have evidence that diffusion[37] is occurring; we modeled impacts on those who reported attending an RTI-MM session and those who reported not attending a session and found positive associations for both groups relative to baseline.

In our sample, physician barriers score was not a strong correlate of practice, although overall, perceived barriers decreased. Our barriers scale focused on systems or organizational-level barriers and the social context in which implementation occurs (eg, residency policy, support from hospital administration), which the practice change literature suggests may be more important than individual-level attitudes or barriers.[22] The RTI-MM was designed to impact systems within a residency clinic, but addressing larger systemic barriers was beyond the scope of the intervention. Physician attitudes score, which measured individual-level concepts, had a small association with self-reported practice. Physician knowledge was not correlated with self-reported practice of MVA in our sample. Knowledge was quite high at baseline, and there may not be enough variation in knowledge to see effects. Knowledge is also recognized to be necessary but not sufficient to implementing practice change;[21,22,38] our results appear to support this conclusion.

Our results provide empirical evidence for the relationship of support staff knowledge, attitudes, and perceived barriers and physician self-reported practice. Our findings support previous qualitative work in reproductive health service implementation that has identified the importance of including clinical and administrative support staff in practice change initiatives.[39,40] Residency

site level mean clinical and administrative support staff knowledge, attitudes, and barriers at follow-up were all independently associated with physician self-reported use of MVA. However, the positive direction of the barriers score was unexpected; we expected higher perceived barriers to be negatively associated with practice of MVA. Although site level mean support staff barriers scores decreased at follow-up overall, two sites had larger barriers scores following the RTI-MM intervention. Support staff may be familiar with logistical and systems barriers to implementing new services; it is possible that following the RTI-MM, these types of barriers became more apparent.

In our sample, residents and faculty from sites participating in an ongoing training program in induced abortion (RHEDI sites) were more likely to implement MVA for spontaneous abortion. This is not surprising—physician and support staff RHEDI trainees are learning the same skills the RTI-MM is designed to teach and have familiarity and probably a comfort level with uterine evacuation beyond that of the other residency sites. Our results support recent findings about office management of spontaneous abortion among obstetrician-gynecologists.[41]

Our results should be interpreted with the following limitations in mind. First, we have a limited ability to make causal inference given our one-group study design. However, our findings were robust to several multivariable modeling approaches that allowed us to control for other potential influences of practice change. Second, our outcome is self-reported practice of MVA. This outcome may in fact more accurately measure intent to use MVA than actual practice. It is possible that not all RTI-MM participants have had the opportunity to use MVA for miscarriage management but would if given the opportunity. The RTI-MM was not designed to train residents and faculty to competency in MVA for spontaneous abortion, and our survey data do not capture actual implementation. Common challenges to procedural training in family medicine, such as sufficient volume and scheduling difficulties[42] likely apply to MVA, and competence using MVA must be measured by faculty in the same way other procedural skills are. Future research should examine ways to measure MVA skills.

Third, as with all anonymous pretest/posttest survey data, we do not have individual level linked data. The results are potentially subject to bias when there is a turnover across time periods, although we maintained a credible response rate. It is possible that individuals most motivated to implement MVA for miscarriage responded to the posttest survey and not the pretest survey, and those least motivated responded to the pretest survey and not to the posttest survey, which would overestimate intervention effects. Our effect size is large, however, and even under these circumstances would be substantial. It is also possible that the non-response reflects normal turnover and was unrelated to motivation to perform MVA.

Finally, it is possible that 6 months is not enough time to see practice change. With a longer follow-up period, we might see the effect of the RTI-MM disappear, or we might see a larger effect as diffusion occurs.

In conclusion, this study reports a positive, robust association between the RTI-MM and use of MVA for management of spontaneous abortion. Non-complicated spontaneous abortion cases should be counseled about the full range of management options, including uterine evacuation using MVA. Integrating MVA into family medicine settings would potentially improve access to evidence-based, quality care for women.

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