

Comparison of Complication Rates in First Trimester Abortions Performed by Physician Assistants and Physicians

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Abstract: The outcomes of 2,458 first trimester abortions performed in a freestanding clinic in Vermont were studied. Procedures were performed by physician assistants and by physicians. Demographic information, medical history, and data relevant to the abortion were recorded. Both immediate and delayed (up to four weeks post-abortion) complications were noted. Direct follow-up four weeks after the procedure by clinic visit, letter, or telephone

contact was achieved for 96 per cent of all patients. An overall rate of 29.1 complications per 1,000 procedures was observed, with a rate of 27.4 for abortions performed by physician assistants and 30.8 for physicians. The incidence of immediate complications was 6.1 per 1,000 procedures; delayed complication incidence was 23.2 per 1,000 procedures. Overall complication rates varied according to operative procedure used. *Am J Public Health* 1986; 76:550-554.)

Introduction

Abortion is one of the most common surgical procedures performed on women. In 1980, there were 1.3 million legal abortions in the United States.¹ The majority were elective first trimester procedures performed in outpatient settings, such as clinics or physicians' offices.²

Issues pertaining to the safety of abortion procedures are important public health concerns. Several definitive studies have evaluated the rates and seriousness of complications resulting from abortions performed in an outpatient setting. Grimes, *et al*,³ determined that the risk of abortion-related death from procedures performed during the first trimester was identical for hospital and outpatient abortions (0.7 per 100,000 procedures) when the rates were adjusted for the presence of pre-existing medical conditions and for the concurrent performance of sterilizations. An overall complication rate of 15.4 per 1,000 procedures was observed by Wulff and Freiman⁴ in their study of first trimester outpatient abortions. One-third of these complications (4.8 per 1,000 procedures) were severe enough to require hospitalization. Bozorgi's study⁵ demonstrated an immediate complication rate of 6.9 per 1,000 procedures in a surgical center. He also detected a positive correlation between complications and gestational age and a significant inverse relationship between complication rates and provider experience.

These studies and others⁶ indicate that abortion in an outpatient setting is a safe procedure when performed by an experienced physician early in pregnancy. However, little is known about the complication rates of abortions performed by physician assistants. This issue is of particular interest in Vermont since physician assistants perform more than 20 per cent of the 3,500 abortions per year occurring in the state.

Approximately half of the abortions in Vermont take place at the Vermont Women's Health Center, a nonprofit independent clinic located in Burlington, Vermont. This paper describes the results of a two-year prospective study, conducted by the Vermont Department of Health and the Women's Health Center, to evaluate the relative complica-

tion rates of physician—versus physician assistant-performed abortions in an outpatient setting.

Methods

The study universe consisted of all women who obtained abortions from a physician or a physician assistant at the Vermont Women's Health Center during the two-year period from January 1, 1981 through December 31, 1982. Physician assistant trainees also participated in a number of procedures at this clinic under supervision of a physician. Those procedures were excluded from this study.

When a patient presented at the Women's Health Center she was seen by the next available provider. There were no differential allocations of patients between provider types. A patient could request a particular provider if she desired. Less than 5 per cent of clinic patients availed themselves of this option.

Two abortion methods were utilized at the facility: early uterine evacuation, and suction curettage. These procedures differ in that the contents of the uterus are evacuated using a hand syringe with early uterine evacuation, whereas in suction curettage a vacuum aspirator is utilized. The decision regarding the appropriate technique for a given patient was made by the provider. Clinic protocol required that early uterine evacuations not be performed later than eight weeks following the patient's last menstrual period provided that this measure of gestational age was consistent with uterine size as estimated by pelvic examination. Contraindications for either procedure included uterine sizing beyond 12-weeks gestation, current use of anticoagulants, hematocrit less than 30 per cent, prolonged bleeding time, and active pelvic inflammatory disease. Only procedures utilizing local anesthetics were performed at this clinic.

Patient participation in the study was voluntary. Upon discharge after abortion, each study participant was instructed to return to the clinic or to her personal physician for a follow-up visit within four weeks. A patient who elected to see her personal physician was given a copy of her medical record and a questionnaire regarding delayed complications to present to her doctor. Patients whose physicians did not return the questionnaire were queried by telephone and/or mail.

Demographic information, medical history, and data relevant to the patient's abortion were recorded on an abstract form by the provider on the day of the procedure. Information regarding delayed complications was added to

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the form by a trained abstractor. Complications were placed into one of seven categories:

- uterine hemorrhage or "excessive bleeding," as determined by patient estimate (soaking two or more pads per hour for four to six hours);
- uterine perforation;
- cervical laceration;
- incomplete abortion or retained products of conception;
- infection (fever 100.4 degrees or higher on two readings and definite uterine tenderness);
- post-abortion syndrome⁴; and
- vagal reaction (rapid drop in blood pressure followed by a short loss of consciousness).

Each complication was further classified as either immediate or delayed. Immediate complications were defined as those evident before the patient was discharged from the clinic on the day of her procedure while delayed complications were those noted within the four-week post-abortion period.

Data forms were visually edited, coded, keyed, and verified. Quality control procedures included the audit of all records with reported complications, as well as a 7 per cent sample of records with no reported complications.

Stepwise logistic regression analysis⁷ was utilized to identify demographic and medical variables associated with abortion complications. This statistical technique sequentially identified variables associated with complications while controlling for the effects of other variables. Each analysis was run several times. Initial runs were used to identify variables which were directly or indirectly associated with the outcome variable under study. Subsequent analyses were performed on a smaller set of independent variables in order to reduce the number of distinct covariate patterns.

Results

During the 24 months of the study, physician assistants and physicians performed 2,601 elective abortions on 2,454 women at the Vermont Women's Health Center. A total of 2,458 procedures (94.5 per cent) were included in the study. All procedures on the 146 women having two or more abortions during the study period were included in the analysis.

In general, the study group was representative of the population of women seeking abortion services in Vermont.⁸ Almost one-third (29 per cent) were under age 20 and an additional 42 per cent were between the ages of 20 and 24. Most (77 per cent) were single, over half (53 per cent) had more than a high school education, and almost all (98 per cent) were White. The majority (54 per cent) had had no previous pregnancies; 68 per cent had not had a previous abortion, 23 per cent had had one prior abortion, and 8 per cent two or more. Of these women, 1,285 were aborted by physician assistants and 1,173 by physicians. These two groups of patients had similar demographic profiles and pregnancy histories (Table 1).

The patients of physician assistants had abortions earlier in their pregnancies than did the patients of physicians (Table 1). Thirty-five per cent of physician assistant-performed abortions were after the eighth week of gestation by pelvic estimate compared to 41 per cent of abortions performed by physicians. There was also a difference in the procedure used by each group; 43 per cent of physician assistant-performed abortions were early uterine evacuations compared to 32 per cent of physician-performed abortions.

Information regarding the occurrence of delayed com-

plications was obtained on 96 per cent of all study participants. Forty-seven per cent of patients returned to the Vermont Women's Health Center for a follow-up visit. Follow-up information for an additional 24 per cent of patients was obtained from the patient's personal physician. Active follow-up procedures (mail/telephone) produced information on another 26 per cent. There were no important differences in complication rates among the follow-up methods.

An overall complication rate of 29.1 complications per 1,000 procedures (95 per cent CI = 22.3-35.9) was observed. The rate of immediate complications was 6.1 (95 per cent CI = 3.0-9.2) while the delayed complication rate was 23.2 (95 per cent CI = 17.1-29.3). These rates are not additive because three women had two or more complications. No differences in complication rates were found between physician assistants and physicians with respect to overall, immediate, or delayed complications. These findings held when we computed variable-specific rates for gestational age and type of procedure (Table 2). These were the only demographic or pregnancy history variables that differed between the study populations served by physician assistants and physicians. The overall complication rate for physician assistants was 27.4 per 1,000 procedures (95 per cent CI = 18.3-36.5). The comparable rate for physicians was 30.8 (95 per cent CI = 20.7-40.9). The immediate complication rates were 4.7 (95 per cent CI = 1.0-8.4) for physician assistants and 7.7 (95 per cent CI = 2.7-12.7) for physicians; delayed complication rates were 22.6 (95 per cent CI = 14.3-30.9) and 23.8 (95 per cent CI = 14.9-32.7) for physician assistants and physicians, respectively.

Stepwise logistic regression analysis identified one variable which was associated with the total complication rate, abortion procedure. A higher total complication rate was observed for early uterine evacuation procedures (39.1; 95 per cent CI = 26.4-51.8) than for suction curettage (23.0; 95 per cent CI = 15.4-30.6). This relationship was due to an increased number of delayed complications with the early uterine evacuation procedure (Table 3) and was independent of practitioner type. Neither immediate nor delayed complication rates were associated with gestational age for suction curettage procedures. In contrast, the complication rates for early uterine evacuations performed at seven to eight weeks gestation were substantially higher than the rates for those performed at earlier gestational ages. The total complication rate for early uterine evacuation procedures performed at less than seven weeks was 5.4 (95 per cent CI = 0.0-15.9) while the rate for procedures performed during weeks seven and eight was 48.6 (95 per cent CI = 32.7-64.5).

The most frequently observed immediate complication, incomplete abortion, accounted for over 40 per cent of all immediate complications in both early uterine evacuation and suction curettage procedures (Table 4). Infection was the delayed complication observed most often in suction curettage procedures, accounting for two-thirds of these complications. Uterine hemorrhage, retained products of conception, and infection were the most common delayed complications in the early uterine evacuation procedure, together accounting for almost all (96 per cent) of these delayed complications.

Discussion

Physician assistants have existed in Vermont since at least 1967. They are certified by the Board of Medical Practice. The Vermont statutes define a physician assistant as

TABLE 1—Characteristics of Study Population by Practitioner Type

Characteristics	Total N	Physician Assistants	Physicians
	N	%	%
Age (years)			
Under 18	225	9.3	9.0
18–19	498	20.3	20.2
20–24	1,029	41.1	42.7
25–34	617	25.3	24.9
35 and over	83	3.7	3.1
Unknown	6	0.3	0.2
Race			
White	2,419	98.2	98.6
Other	31	1.3	1.2
Unknown	8	0.5	0.2
Marital Status			
Single	1,902	77.8	76.9
Married	286	11.7	11.6
Other	234	8.6	10.5
Unknown	36	1.9	1.0
Education			
Less than high school	258	10.4	10.6
High school graduate	837	34.2	33.8
Some college	892	36.3	36.3
College graduate	416	16.9	17.0
Unknown	55	2.2	2.3
Previous Pregnancies			
0	1,337	54.9	53.7
1	593	23.7	24.6
2	262	10.6	10.7
3 or more	262	10.5	10.8
Unknown	4	0.2	0.1
Previous Live Births			
0	1,918	79.1	76.8
1	282	11.1	11.9
2	158	6.1	6.8
3 or more	88	3.3	3.9
Unknown	12	0.5	0.5
Previous Abortions			
0	1,683	67.9	69.1
1	563	22.5	23.4
2	141	6.4	5.0
3 or more	56	2.6	2.0
Unknown	15	0.6	0.6
Weeks Gestation by Pelvic Estimate			
Less than 7	204	7.5	9.2
7–8	1,322	57.4	49.8
9–10	703	27.1	30.3
11–12	202	7.5	9.0
13 or more	17	0.2	1.3
Unknown	10	0.4	0.4
Procedure			
Early Uterine Evacuation	924	43.0	31.6
Suction Curettage	1,534	57.0	68.4

“an individual certified by the State of Vermont who is qualified by education, training, experience, and personal character to provide medical services under the direction and supervision of a Vermont licensed physician.”⁹

Physician assistants obtain their training either through formal education (i.e., graduation from a program approved by the Board of Medical Practice) or through an apprenticeship. Those who train as apprentices are required to register with the Board as trainees and to complete a Board-sanctioned apprenticeship program under the direction of a licensed physician. The programs are individually tailored to provide necessary knowledge and skills. Each trainee must pass a qualifying examination to obtain certification. All of the physician assistants employed at the Vermont Women's Health Center are apprentice-trained.

The physician assistant's scope of practice is restricted to those functions delegated by the supervising physician and for which the assistant is qualified by education, training, and

experience. The practice scope cannot exceed the normal limits of the supervising physician's experience. The legal liability associated with physician assistant practice is essentially deemed to the delegating physician, the relationship between supervising physician and physician assistant being statutorily defined as that of principal and agent.

Physician assistants have been providing abortion services in the state since 1975. The major finding of this study is that there are no differences between procedures performed by physicians and those performed by physician assistants with respect to overall, immediate, or delayed complication rates.

The immediate complication rates observed in this study are similar to those found in previous studies. Wulff and Freiman⁴ reported an immediate complication rate of 5.0 complications per 1,000 suction curettage procedures, while Bozorgi⁵ observed an immediate rate of 6.8. The comparable

TABLE 2—Total Complication Rates* for Physician Assistants and Physicians by Procedure and Weeks Gestation

Weeks Gestation	Physician Assistants Rate* and 95% CI	Physicians Rate* and 95% CI	Difference (Phys minus PA) Rate* and 95% CI
Early Uterine Evacuation			
Less than 7	0.0	10.5 (0.0,31.0)	10.5 (-20.8,41.8)
7-8	45.5 (26.0,65.0)	53.8 (26.4,82.1)	8.3 (-28.4,45.0)
9-10	#	#	
11 and over	-	-	
Total	37.4 (21.3,53.5)	41.9 (21.1,62.7)	4.5 (-24.1,33.1)
Suction Curettage			
Less than 7	#	#	
7-8	14.7 (0.4,29.0)	22.8 (6.1,39.5)	8.1 (-17.4,33.6)
9-10	24.2 (7.6,40.8)	20.3 (5.4,35.2)	-3.9 (-29.2,21.4)
11 and over	21.3 (0.0,50.5)	35.1 (1.3,68.9)	13.8 (-40.5,68.1)
Total	20.1 (9.7,30.5)	26.0 (14.8,37.2)	5.9 (-10.8,22.6)

*Rates per 1,000 procedures.
#Fewer than 10 procedures performed.
-No procedures performed.

TABLE 3—Total Complication Rates* by Procedure and Time of Complication

Time of Complication	Early Uterine Evacuation Rate* and 95% CI	Suction Curettage Rate* and 95% CI	Difference (EUE minus Suct) Rate* and 95% CI
Immediate	6.5 (1.3,11.7)	5.9 (2.1,9.7)	0.6 (-6.7,7.9)
Delayed	32.4 (20.8,44.0)	17.6 (10.9,24.3)	14.8 (0.5,29.1)
Total	39.1 (26.4,51.8)	23.0 (15.4,30.6)	16.1 (0.4,31.8)

*Rate per 1,000 procedures.

TABLE 4—Distribution of Complications by Procedure and Time of Complication

Complications	Early Uterine Evacuation No.	Suction Curettage No.	No.	Total Per Cent
Immediate				
Uterine Perforation	2	0	2	13
Cervical Laceration	0	4	4	25
Incomplete Abortion	3	4	7	44
Post-abortion Syndrome	0	1	1	6
Vagal Reaction	1	1	2	13
Delayed				
Uterine Hemorrhage	10	4	14	25
Retained Products	11	4	15	26
Infection	8	18	26	46
Post-abortion Syndrome	1	1	2	4

rate in the current study was 5.9 complications per 1,000 suction curettage procedures.

The aggressive follow-up procedures utilized in this study exceed those of studies which relied on self-reporting of delayed complications, which may explain why the delayed complication rate observed was over twice that reported by Wulff and Freiman.⁴ However, it is interesting to note that comparable rates have been observed for specific delayed complications. Cates, *et al*,¹⁰ reported an infection rate of 10.3 as compared with a rate of 10.6 in this study. Rates for cervical injury and uterine perforation observed in the Cates study were also comparable to the present findings.

The overall complication rate observed with the suction curettage procedure was comparable to that reported by Grimes and Cates⁶ at 7-8 weeks gestation. However, unlike the Grimes and Cates study, the suction curettage complication rate observed here did not increase significantly with gestational age, but remained approximately constant through 12 weeks gestation. In contrast, the high delayed

complication rate observed at 7-8 weeks gestation with the early uterine evacuation procedure was due to substantially higher rates of uterine hemorrhage and retained products of conception. We have advised the Vermont Women's Health Center of the finding of higher complication rates for the early uterine evacuation procedure, and the Center has since revised its protocols.

This study has shown that in a specific Vermont clinic there are no differences in complication rates between those women who had abortions performed by a physician assistant and those who had the procedure performed by a physician. Generalization of this conclusion to other practices could have significant implications for involving physician assistants in the provision of abortions. However, the unique aspects of the Vermont Women's Health Center (e.g., the ethnic homogeneity of the population served; the supervision and training of the physician assistants) may preclude such generalization without further investigation.

ACKNOWLEDGMENTS

We are indebted to the staff of the Vermont Women's Health Center, and specifically to Dana Gallagher and Claudia Cusson, for their cooperation and assistance, and to Pamela Noble-Ashikaga for her excellent technical contribution.

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The Public Health Foundation, in cooperation with the Centers for Disease Control (CDC), seeks case reports of sudden unexplained death syndrome (SUDS) in Southeast Asians as part of a nationwide surveillance program for SUDS. SUDS is the death of a person at least 2 years of age for whom a post mortem examination does not reveal the underlying cause of death; the decedent must have been born in or have had at least one parent born in Vietnam, Kampuchea (Cambodia), Laos, Thailand, the Philippines, or some other Southeast Asian country. A complete case report consists of the death certificate, the coroner's investigative report (if available), and an autopsy report, including the findings of external, internal, and microscopic examinations, and the results of toxicologic studies. The surveillance program began on February 1, 1986, and ends on January 31, 1987. If you know of a SUDS case or would like information about SUDS, please call or write one of the persons listed below.

Dorothy Downes, Public Health Foundation, 1220 L Street, NW, Washington, D.C. 20005 (telephone: 202 898-5600); or Gib Parrish or Myra Tucker, Center for Environmental Health, Centers for Disease Control, Atlanta, GA 30333 (telephone: 404 452-4191).