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Costs of Alternative Treatments for Incomplete Abortion

Brooke R. Johnson, Janie Benson,
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and Khama Rogo

How to reduce the cost of treating incomplete abortions, a leading cause of maternal deaths.

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This paper — a product of the Population and Human Resources Department — is part of a larger effort in the department to improve the status of women's health. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Otilia Nadora, room S6-065, extension 31091 (January 1993, 31 pages).

Unsafely performed abortion is one of the five leading causes of maternal deaths worldwide. Many women who have undergone unsafe abortions enter the healthcare system to seek help for the resulting complications, including incomplete abortion. The human and financial cost of this health problem is tremendous, especially in the developing world.

This study examined the potential for reducing costs to healthcare systems by changing the standard method of treatment for incomplete abortion. Vacuum aspiration (VA) has been shown to be safer than dilation and curettage (D&C) for uterine evacuation; the World Health Organization includes VA as an essential service at the first referral level.

The technique most commonly used for treating first-trimester incomplete abortion in developing countries, however, is D&C. This study examined the hypothesis that use of manual vacuum aspiration (MVA) — a variation of VA — would be less costly than D&C and thus advantageous to healthcare systems with limited resources.

The purpose of the study was to identify and, where possible, to explain the factors that contributed to cost differences between MVA and D&C for treatment of first-trimester incomplete abortion. To achieve this objective, researchers observed patient management and documented resource use at hospital sites in Ecuador, Kenya, and Mexico.

In most cases, treatment with MVA required a shorter patient stay and fewer hospital resources than D&C, as the two techniques were practiced at the various study sites. The policy decision to adopt MVA, supported by procurement of instruments and incorporation of training in its use, is the chief prerequisite for achieving these improvements.

But the full advantages of MVA are realized only if it is introduced in conjunction with certain changes in patient-management practices, such as offering outpatient treatment of incomplete abortion.

Further, decentralizing MVA services can maximize the benefits of the technique, facilitating (hospitals' and) healthcare systems' efforts to decrease the cost of delivery service and improve the quality of care.

Produced by the Policy Research Dissemination Center

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Acknowledgments

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IPAS is an international nonprofit organization that addresses the global problem of unsafe abortion. IPAS' primary mission is to promote safe, respectful abortion care, defined as:

- appropriate and timely treatment for abortion complications;
- options for safe, voluntary abortion; and
- comprehensive family planning counseling and services to reduce the need for abortion.

The study methods -- including sample data collection forms and instructions for data collection and analysis -- are available to hospital administrators, clinicians and policymakers. A summary of the study's major findings is available in English and Spanish as an issue of IPAS' technical bulletin series, *Advances in Abortion Care* [1,2]. Please send inquiries to:

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Introduction

Faced with decreasing financial resources, healthcare systems in the developing world must cope with serving increasing numbers of clients. The delivery of abortion services, especially for treatment of abortion complications, has been particularly affected by this phenomenon.

Manual vacuum aspiration is a safe, simple technique for treatment of first-trimester incomplete abortion, with important potential for decentralization of service delivery. The patient-management practices facilitated by use of the technique led researchers to hypothesize that replacing dilation and curettage -- the current standard for treatment of incomplete abortion in the developing world -- with manual vacuum aspiration would result in significant decreases in hospital resource utilization.

Researchers collected data that documented the utilization of resources associated with use of manual vacuum aspiration and dilation and curettage in three countries -- Kenya, Mexico, and Ecuador. Overall, the study results supported the researchers' hypothesis, revealing reduced resource utilization with manual vacuum aspiration in most study sites. The results also highlighted the importance of adapting patient-management protocols in conjunction with introducing the technique and suggested additional benefits that can follow implementation of manual vacuum aspiration. These and other implications for changes in policy and practice relevant to the provision of abortion care are delineated in the remainder of this document.

Background

Unsafe abortion is one of the five leading causes of maternal mortality worldwide. The way hospitals commonly manage the treatment of incomplete abortion, which often results from unsafe abortion, drains scarce resources in healthcare systems throughout the developing world [3-9]. Indeed, some systems spend 50% to 60% of their obstetric/gynecology (ob-gyn) budgets to treat this medical problem [10-12]. Given this high level of resource consumption, reducing the costs associated with treating incomplete abortion would be clearly advantageous.

In much of the developing world, dilation and curettage (D&C) is the most commonly used technique for treating incomplete abortion [13].[1] The procedure is usually performed in a hospital setting where physicians and operating rooms are available; it often includes heavy sedation for pain control and an overnight hospital stay for patient recuperation and monitoring.

Vacuum aspiration (VA) has been shown to be safer than D&C for uterine evacuation [14-18], and the World Health Organization includes VA as an essential service at the first referral level [19]. Vacuum aspiration usually requires neither heavy sedation nor an overnight hospital stay and can be performed in a treatment room or outpatient clinic rather than in an operating room. For these reasons, VA appears to be a more cost-effective technique than D&C as it is generally practiced in the developing world [5,20].

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[1] Dilation (or dilatation) and curettage (D&C) is used throughout this paper to include all sharp curettage procedures, even though for many incomplete abortion patients dilation has occurred prior to the actual evacuation procedure.

Manual vacuum aspiration (MVA) is a variation of vacuum aspiration. It employs a portable, nonelectric, single- or double-valve syringe that has been demonstrated to produce a vacuum as effective as that produced by an electric aspirator [21]. For nearly two decades, MVA has been successfully utilized in a variety of healthcare settings worldwide.

The costs and resource utilization of different methods of uterine evacuation have been neither documented nor compared based on actual observations of patients treated for incomplete abortion; however, many of the hospital resources associated with the treatment of incomplete abortion (for example, hospitalization time, procedure time, blood transfusions and anesthesia) have been identified and their costs calculated based on hospital records [5,22]. A Colombian study examined the clinical and managerial aspects of hospital treatment of incomplete abortion with vacuum aspiration (VA) and dilation and curettage (D&C) [23]. Two of the study's findings were: 1) that outpatient management using either VA or D&C resulted in decreased patient stay and 2) that the use of anesthesia was greater for D&C primarily because of long-established patterns of practice.

Purpose of the Study

The attributes of D&C and MVA described above led to the hypothesis that MVA would be less costly to healthcare systems than D&C, primarily because MVA does not involve heavy sedation, operating rooms, or overnight hospital stays, and therefore requires fewer staff and less staff time per patient. This study was a demonstration project designed to identify and, where possible, explain the factors that contribute to the cost differences between use of the two clinical procedures for treatment of first-trimester incomplete abortion. To achieve these objectives, researchers observed patient management and documented use of financial and other resources in an attempt to assess and, where appropriate, compare the type and number of resources required for each procedure. The study was implemented at selected hospital sites in Kenya, Mexico and Ecuador.

This study was designed to help researchers examine the *actual practice* of D&C and MVA. It was not intended to produce comparative data for statistical applications; however, a limited amount of comparative analysis can enable policymakers and managers to identify trends in resource utilization and abortion-patient management. All comparisons that follow are made with the cautionary note that many clinical, administrative, economic and geographic factors vary among different hospitals and may affect resource consumption and, hence, costs.

Following a brief methods section we present the results of data collected in Kenya, Mexico and Ecuador and discuss the implications of the study's results for policy and practice within hospitals and healthcare systems with similar abortion-management protocols.

Methods

Study Sites and Sample

The study was conducted between January and August 1991 at four hospitals in Kenya (KEN1-4), five hospitals in Mexico (MEX1-5) and five hospitals in Ecuador (ECU1-5). Table 1 summarizes important characteristics of the study sites.[2] At these hospitals, uterine evacuation was performed by physicians -- either staff doctors or residents. With two exceptions, at any given time, the hospitals used either MVA or D&C, but not both, to treat patients for first-trimester incomplete abortion.[3] Field staff reported that, except for two of the Ecuadorian sites, patient caseload, staff and patient-management protocols during the period of data collection were generally typical of the respective study locations.[4] There were slight variations in the way data were collected and costs calculated among but not within the countries where the study was conducted.

In Kenya, D&C was done exclusively in the main operating room, and patients were admitted for an overnight stay in the gynecology ward. MVA was performed in a treatment room located in the gynecology ward, and patients recuperated for a brief time in the ward. MVA patients' overnight stays were generally attributable to administrative or personal but not medical reasons. In Mexico, both D&C and MVA were performed either in the gynecology surgical room or another evacuation room within the ob-gyn surgical unit (*tococirugia*); all MVA and some D&C patients recovered in the ambulatory surgery area while other D&C patients were admitted to the ward for an overnight stay. In Ecuador, both D&C and MVA were performed in an evacuation room in all but Hospital ECU5 where MVA was performed in the emergency room.

Women chosen for the study were those with incomplete abortion (spontaneous or induced outside of the hospital) of less than 13 weeks uterine size, as determined by a bi-manual pelvic exam, and whose primary medical need was uterine evacuation -- that is, women with a presenting diagnosis of incomplete abortion and no *other* major presenting complications. Women whose presenting diagnosis was incomplete abortion with additional complications of septicemia, intra-abdominal injury or others were not included in the study.

Patients with presenting complications in addition to incomplete abortion were excluded from the study for two reasons. First, they do not represent the "typical" patient who presents with incomplete abortion [24-27]. Second, treatment of additional complications would be the same regardless of which evacuation procedure was used; the total length of a patient's stay, and thus total resource

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[2] For a more detailed description of the study sites refer to Appendix 1.

[3] At Hospital MEX5 in Mexico, both MVA and D&C were utilized. At Hospital ECU1 in Ecuador, where D&C is used for the vast majority of incomplete abortion cases, one provider used MVA for two cases during the data-collection period. For methodological reasons the MVA cases at Hospital ECU1 were not included in the project results.

[4] Project field staff were told that caseloads at these two sites (ECU3 and ECU4) were low because of intermittent strikes by hospital personnel just before the data-collection period. In addition, widespread knowledge of a severe lack of medical supplies at Hospital ECU3 may have caused potential patients to go elsewhere for treatment.

consumption, would be more dependent on the severity of the presenting complication(s) than the method used for uterine evacuation. Thus, including these patients during a brief data-collection period would have biased the results in favor of the procedure with the fewest patients with *other* complications.

Table 1. Characteristics of Study Hospitals by Country and Procedure

Characteristic	Kenya (4 hospitals)		Mexico (5 hospitals)		Ecuador (5 hospitals)	
	D&C	MVA	D&C	MVA	D&C	MVA
No. of Data Collection Sites	2*	4*	5**	1**	1***	2***
No. of Cases	22	77	66	8	13	14
System	Ministry of Health (MOH)	MOH	Mexican Social Security System (IMSS)	IMSS	MOH	National Welfare Board and MOH/ municipal government
Hospital Level	secondary (4)	secondary (3) tertiary (1)	secondary (3) tertiary (2)	tertiary (1)	tertiary (1)	secondary (2)
Location of Procedure	central operating room	treatment room in gynecology ward	gynecology surgical room/ evacuation room	gynecology surgical room/ evacuation room	evacuation room	evacuation room/ treatment room in emergency room
Provider	physician	physician	physician	physician	physician	physician
Pain Control	light sedation	none	heavy sedation	paracervical block	heavy sedation	heavy sedation/ paracervical block
Recovery Protocol	overnight stay in gynecology ward	brief stay in gynecology ward until able to leave	overnight stay, or stay in ambulatory surgery	brief stay in ambulatory surgery until able to leave	brief stay in side room, evacuation room, or hallway until able to leave	overnight stay in ward or stay in recovery room; brief stay in emergency room until able to leave

* KEN1 and KEN2 were D&C sites prior to the implementation of MVA; data were collected on D&C patients and, subsequently, on MVA patients.

**In one hospital, MEX5, data were collected for both D&C and MVA patients.

***Data collected at two hospitals (ECU3 and ECU4) were excluded due to very low caseloads.

Data Collection and Analysis

Researchers used rapid-assessment data-collection techniques to identify factors that contributed to cost and to explain some of the variations in cost that occurred among different sites. Rapid-assessment procedures include qualitative, cross-sectional, limited-duration field observations and interviews of small, non-representative study populations. Such procedures usually produce quantifiable data that may suggest economic and/or behavioral trends.

Rapid-assessment methods [28] are most effective when focused on a specific, well-defined issue with a narrow range of (probable) procedural and/or behavioral variation, as is the case for treatment of first-trimester incomplete abortion in hospital settings. For the treatment of incomplete abortion, there are a limited number of intra-hospital variations in time and cost of a given procedure (e.g., MVA or D&C). Where costs vary *between* the two procedures, the differences were expected to be large enough to justify use of rapid-assessment techniques. Because of the circumscribed nature of the issue under study, and because of the field staffs' familiarity with most of the study sites, a brief observation period and small sample size were considered adequate.

The research design was similar to a study that estimated clinic costs for menstrual regulation patients in Bangladesh [29]. As in Kay and Kabir's study, project field staff attempted to identify all of the significant resources associated with abortion care. Instead of using estimates as a basis for determining costs, however, the data-collection protocol called for field staff to document, where possible, actual expenditures of time and resource units by accompanying patients from the beginning to the end of their hospital stay.

Field staff began the data-collection process by interviewing hospital administrators and/or clinicians to learn about the hospitals and their management and staffing situations. This allowed field staff to become more familiar with the sites and to begin to discern the contexts within which patients were treated for incomplete abortion. Field staff also interviewed gynecologists, nurses and patients. They consulted health-system, hospital and patient records to obtain detailed information about admission and discharge procedures, caseload and case management and assessment.

Hospital costs associated with treatment of incomplete abortion -- including salaries and costs of drugs, medical instruments, miscellaneous supplies and hospitalization -- were determined by checking salary tables, drug cost lists, central operations records and health-system budgets. All of the information (except overhead expenses) obtained from interviews and records was confirmed or modified by subsequently observing the complete treatment process abortion patients undergo from admission to discharge. A detailed account of the major cost determinants appears in Appendix 2.

To ensure that cost calculations would reflect routine variations in staffing patterns and daily caseloads, observations took place over a minimum seven-day period at each site. Data collected were limited to standard D&C procedures and MVA procedures performed with IPAS' Karman cannulae and syringes.

The study design called for data collectors to observe at least 15 women at each site throughout their entire hospital stay for treatment of incomplete abortion. The researchers considered a sample size of 15 to represent a reasonable number of observations for one person to make during a one-week data-collection period. Also, researchers judged that 15 patient observations would be sufficient to

generalize about patient management within a given site. Because of small caseloads during the week-long observation periods, the minimum sample size of 15 patients was not achieved at every site.

At two hospitals in Kenya (KEN1 and KEN2), project staff collected data on D&C patients before MVA was implemented. After MVA was introduced, data were again collected on patients treated for incomplete abortion. Since time and cost data for both procedures were collected at the same site, most of the site variables (such as hospital level, staff efficiency and caseload) were virtually the same. Thus, these sites most accurately demonstrate time and cost differentials between the two techniques.

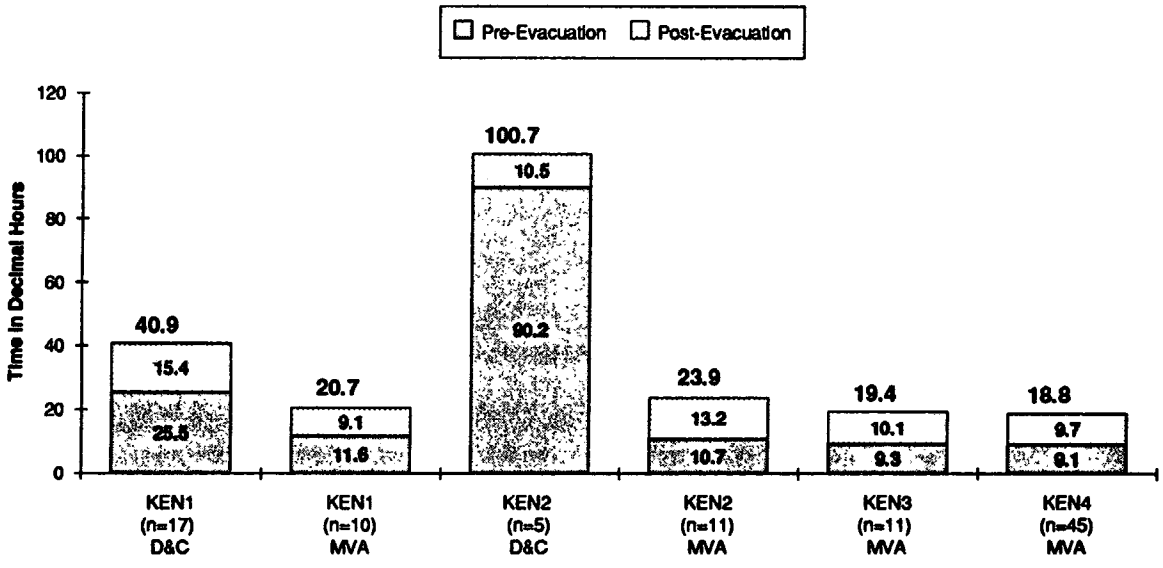
Results

Duration of Hospital Stay

Kenya

Figure 1 shows the average total patient stay in each of the four Kenyan hospitals.[5] For D&C patients, the average duration of stay ranged from 40.9 to 100.7 hours. In contrast, the average stay of MVA patients ranged from 18.8 to 23.9 hours. At the two hospitals where both D&C and MVA data were collected, differences in average total stay per patient were notable. In Hospital KEN1, total stay for MVA patients was 49% shorter than for D&C patients -- 20.7 versus 40.9 hours. In Hospital KEN2, total stay was 76% shorter for MVA patients -- 23.9 versus 100.7 hours. For all sites studied in Kenya, the hospital with the longest average stay for patients treated with MVA (23.9 hours) was 42% shorter than the hospital with the shortest average D&C patient stay (40.9 hours).

Figure 1. Average Total Patient Stay in Kenya, by Hospital and Type of Procedure



In Kenya, the pre-evacuation period for D&C patients accounted for most of the total hospital stay. Average pre-evacuation times for D&C patients were 25.5 and 90.2 hours, representing 62% and 90% of the total hospital stay, respectively. For MVA patients, average pre-evacuation times ranged from 9.1 to 11.6 hours (45% - 56% of the total stay). Post-evacuation stay for D&C patients ranged from 10.5 to 15.4 hours; for MVA patients the range was from 9.1 to 13.2 hours.

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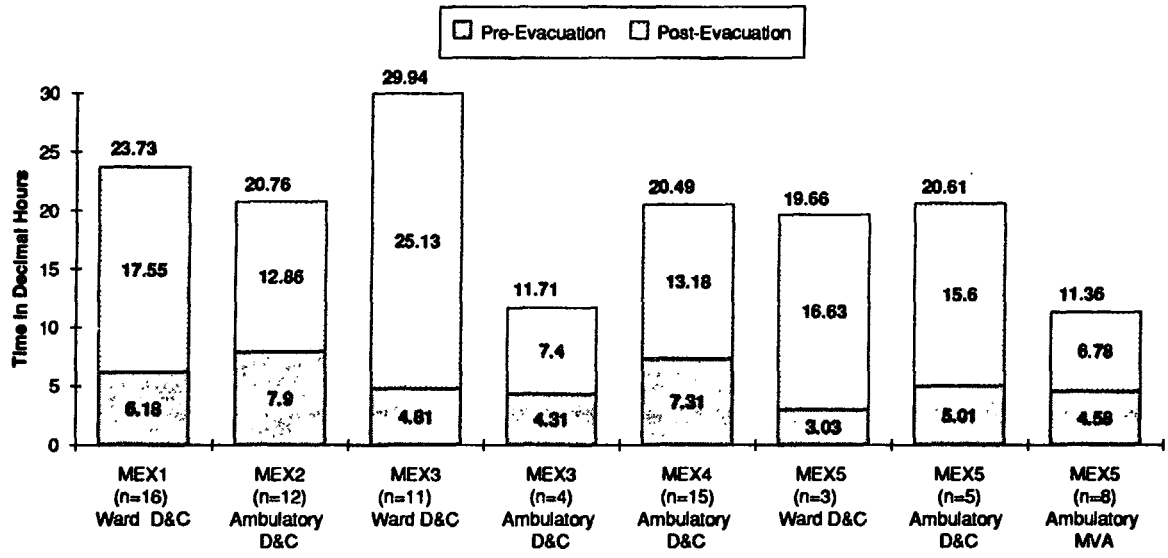
[5] For all sites, patient stay was divided into pre- and post-evacuation waiting time. "Pre-evacuation" included elapsed time from admission through the uterine evacuation procedure. "Post-evacuation" included elapsed time from the completion of the evacuation procedure until discharge.

Mexico

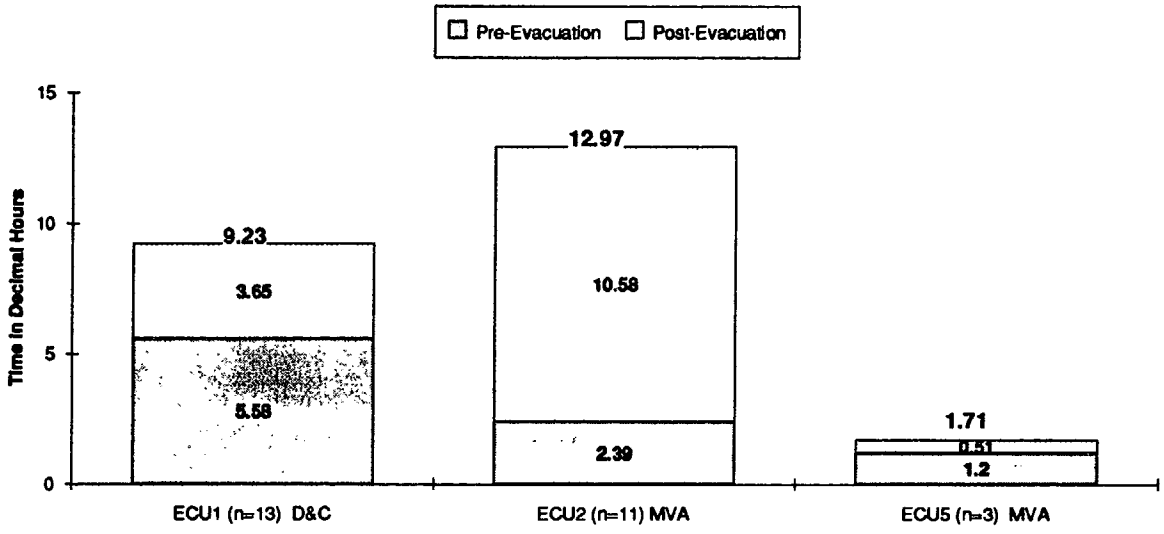
In Mexico, the average stay for D&C patients ranged from 11.71 to 29.94 hours depending on where they recovered (i.e., ward or ambulatory surgery -- see Figure 2). By contrast, the average total duration of stay for MVA patients at Hospital MEX5 was 11.36 hours. At Hospital MEX5, where both D&C and MVA were performed, MVA patients' average hospital stay was 45% shorter (11.36 versus 20.61 hours) than the average stay of ambulatory D&C patients.

Figure 2. Average Total Patient Stay in Mexico, by Hospital and Type of Procedure



Average pre-evacuation times for D&C ranged from 3.03 to 7.9 hours, compared with 4.58 hours at the MVA site. Average post-evacuation times showed great variation: from 7.4 to 25.13 hours for D&C, and 6.78 hours for MVA. In contrast to D&C patients in Kenya, post-evacuation time was the largest component of total stay: from 62% to 85% of total stay for D&C patients in Mexico, and 60% of total stay for MVA patients.

Figure 3. Average Total Patient Stay in Ecuador, by Hospital and Type of Procedure



Ecuador

Figure 3 shows the average total patient stay in each of the three Ecuadorian hospitals. At Hospital ECU1, the average total duration of stay for D&C patients was 9.23 hours. For the MVA patients at Hospital ECU2, the average total stay was 12.97 hours, and for the MVA patients at Hospital ECU5, only 1.71 hours.

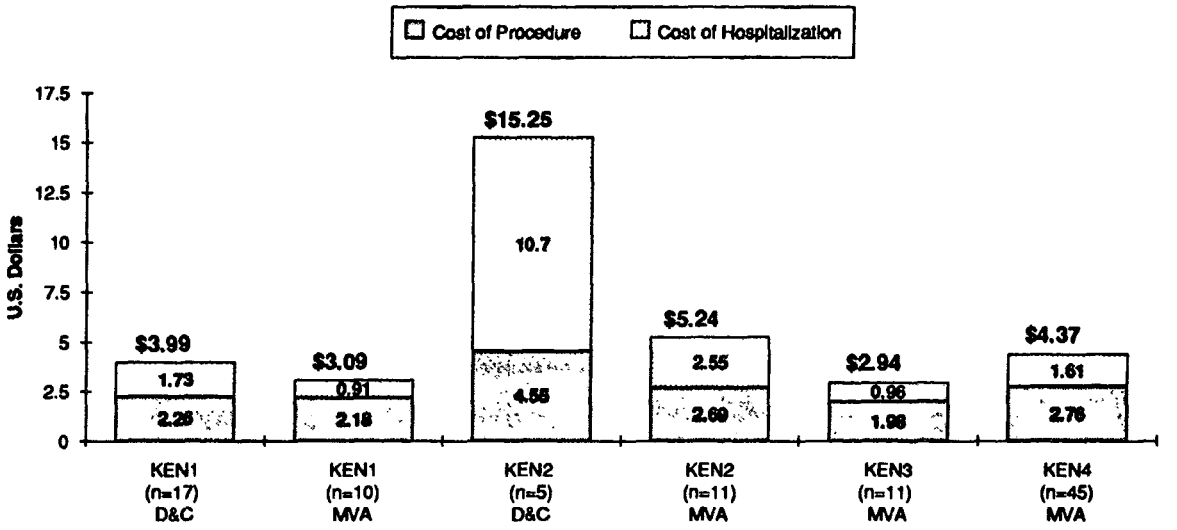
At Hospital ECU1, pre-evacuation time for D&C patients was 5.58 hours, compared to 2.39 hours for MVA patients at Hospital ECU2, and 1.2 hours at Hospital ECU5, where MVA was done on an outpatient basis. Conversely, at ECU1, women were discharged from the hospital an average of 3.65 hours after completion of the D&C procedure and 10.58 hours after the procedure at the MVA site (ECU2). Post-evacuation time at Hospital ECU5 was only 0.51 hours.

Cost of Treating Patients for Incomplete Abortion

Kenya

Figure 4 and Table 2 show the average patient cost for D&C and MVA at four study sites in Kenya. At these sites, total cost per patient was lower for MVA than for D&C. At Hospital KEN1, the average cost per MVA patient was $3.09 -- 23% less than the average patient cost of $3.99 for D&C. At Hospital KEN2, the average MVA patient cost was $5.24 -- 66% less than the average D&C patient cost of $15.25.

Figure 4. Average Total Patient Cost* in Kenya, by Hospital and Type of Procedure



*Cost in U.S. dollars. US$1 = 27.7 Kenya Shillings.

Table 2. Average Cost of Treating a D&C or MVA Patient in Kenya, by Hospital and Cost Category

Hospital and Type of Procedure	Number of Cases	Medical Instruments	Re-sterilization	Disposable Supplies	Drugs	Staff	SubTotal	Hospitalization	Total
KEN1 (D&C)	17	0.00 (NC)	0.00 (NC)	0.29 (7%)	0.57 (14%)	1.40 (35%)	2.26 (57%)	1.73 (43%)	3.99
KEN1 (MVA)	10	0.30 (10%)	0.14 (5%)	0.18 (6%)	0.60 (19%)	0.96 (31%)	2.18 (71%)	0.91 (29%)	3.09
KEN2 (D&C)	5	0.00 (NC)	0.00 (NC)	1.31 (9%)	0.65 (4%)	2.59 (17%)	4.55 (30%)	10.70 (70%)	15.25
KEN2 (MVA)	11	0.31 (6%)	0.16 (3%)	0.17 (3%)	0.58 (11%)	1.47 (28%)	2.69 (51%)	2.55 (49%)	5.24
KEN3 (MVA)	11	0.32 (11%)	0.14 (5%)	0.29 (10%)	0.39 (13%)	0.84 (29%)	1.98 (67%)	0.96 (33%)	2.94
KEN4 (MVA)	45	0.31 (7%)	0.08 (2%)	0.23 (5%)	0.58 (13%)	1.56 (36%)	2.76 (63%)	1.61 (37%)	4.37

Costs in U.S. dollars; as of May 1991, US$1 = Ksh 27.7
(NC) = not calculated
(%) = Percentage of average total cost by hospital

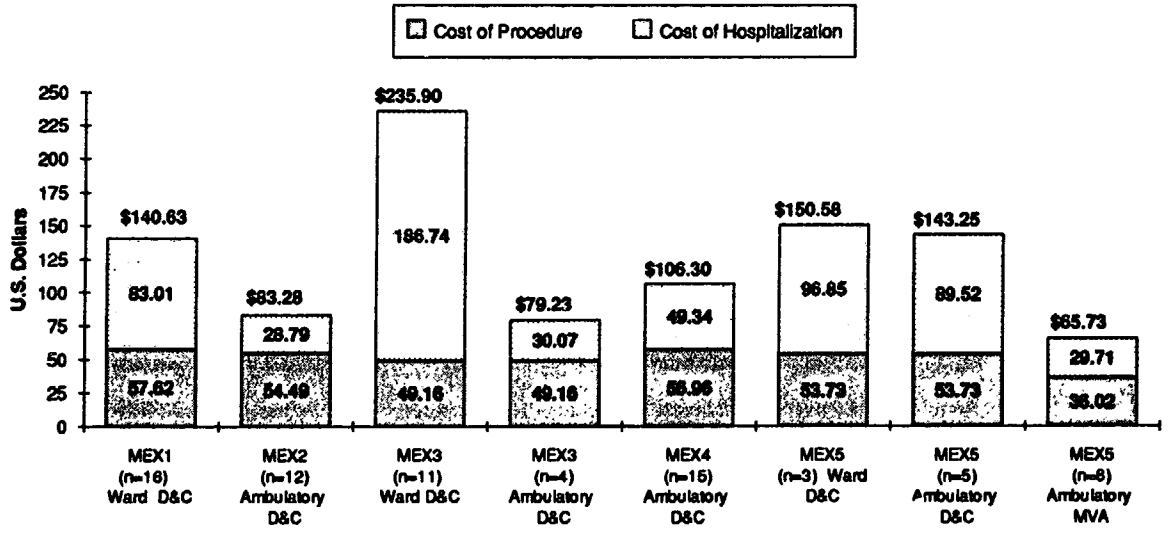
In all but one Kenyan hospital, the cost of hospitalization contributed the largest portion of the average total cost per patient. However, when hospitalization costs were excluded, the average cost per patient for MVA was still less than for D&C: at Hospital KEN1, $2.26 for D&C and $2.18 for MVA, a 4% reduction; at Hospital KEN2, $4.55 for D&C and $2.69 for MVA, a 41% reduction; the average cost per patient, excluding hospitalization, at Hospital KEN3 was $1.98 and at Hospital KEN4, $2.76.

In most of the Kenyan hospitals, personnel costs were the second greatest contributor to average cost per patient. In Hospitals KEN1 and KEN2, staff costs for D&C were markedly higher than for MVA -- $1.40 versus $0.96 (31% less for MVA), and $2.59 versus $1.47 (43% less for MVA), respectively. At Hospital KEN3 staff costs were $0.84 and at Hospital KEN4 (where personnel costs are affected by higher salaries due to the increased cost of living in a large city), staff costs were $1.56 per patient.

Mexico

The differences in average cost per patient to each hospital in Mexico are shown in Figure 5 and Table 3. For the hospitals where D&C was performed, the average cost per patient ranged from $79.23 to $235.90. At Hospital MEX5 an average of $65.73 was spent per MVA patient, making its average patient cost 17% to 72% less than the lowest and highest D&C patient costs, respectively. Within Hospital MEX5, average cost per MVA patient was 56% and 54% less than the average cost for D&C patients (ward and ambulatory surgery at MEX5, respectively).

Figure 5. Average Total Patient Cost* in Mexico, by Hospital and Type of Procedure



*Cost in U.S. dollars. US$1 = 3020 Mexican Pesos.

Table 3. Average Cost of Treating a D&C or MVA Patient in Mexico, by Hospital and Cost Category

Hospital and Type of Procedure	Number of Cases	Medical Instru-ments	Resteril-ization	Disposable Supplies	Drugs	Staff	Laundry	Sub-total	Hospital-ization	Total
MEX1 Ward (D&C)	16	.01 (0%)	4.11 (3%)	5.95 (4%)	8.22 (6%)	36.18 (26%)	3.15 (2%)	57.62 (41%)	83.01 (59%)	**140.63**
MEX2 Ambulatory (D&C)	12	.04 (0%)	2.33 (3%)	6.72 (8%)	5.35 (6%)	36.72 (44%)	3.33 (4%)	54.49 (65%)	28.79 (35%)	**83.28**
MEX3 Ward (D&C)	11	.01 (0%)	3.30 (1%)	5.49 (2%)	3.51 (2%)	33.92 (14%)	2.93 (1%)	49.16 (21%)	186.74 (79%)	**235.90**
MEX3 Ambulatory (D&C)	4	.01 (0%)	3.30 (4%)	5.49 (7%)	3.51 (4%)	33.92 (43%)	2.93 (4%)	49.16 (62%)	30.07 (38%)	**79.23**
MEX4 Ambulatory (D&C)	15	.01 (0%)	1.63 (2%)	6.11 (6%)	7.58 (7%)	38.30 (36%)	.43 (3%)	56.96 (54%)	49.34 (46%)	**106.30**
MEX5 Ward (D&C)	3	.09 (0%)	2.33 (2%)	5.39 (4%)	10.50 (7%)	32.67 (22%)	2.75 (2%)	53.73 (36%)	96.85 (64%)	**150.58**
MEX5 Ambulatory (D&C)	5	.09 (0%)	2.33 (2%)	5.39 (4%)	10.50 (7%)	32.67 (23%)	2.75 (2%)	53.73 (38%)	89.52 (62%)	**143.25**
MEX5 Ambulatory (MVA)	8	.33 (1%)	.21 (0%)	4.95 (8%)	4.79 (7%)	23.23 (35%)	2.51 (4%)	36.02 (55%)	29.71 (45%)	**65.73**

Costs in U.S. dollars; as of May 1991 US$1 = MN 3020

(%) = Percentage of average total cost by hospital

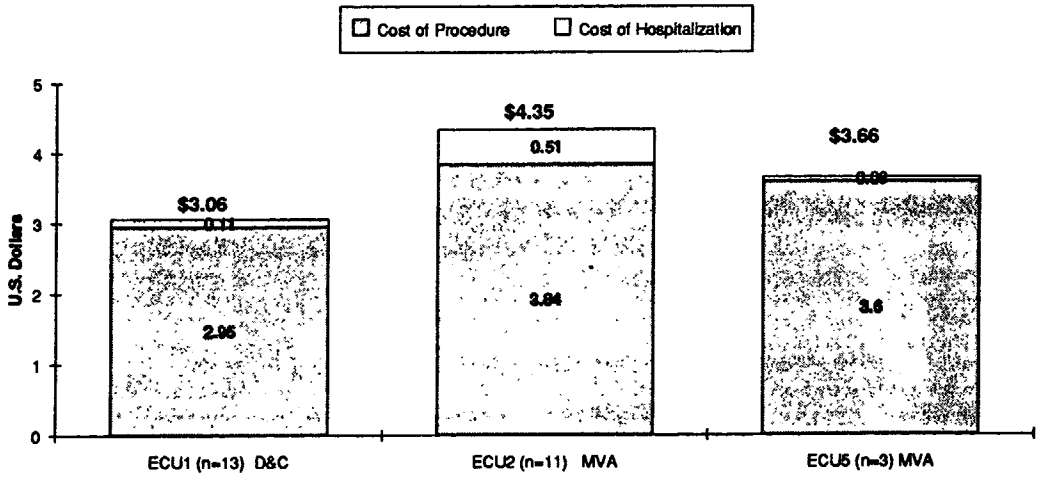
In the Mexican hospitals, hospitalization costs accounted for the largest portion of average total cost per ward patient as well as for the wide range of variation in cost per D&C patient (ward or ambulatory). But, as in Kenya, even when hospitalization costs were excluded, average cost per MVA patient remained lower than for D&C patients. For MVA, the cost per patient excluding hospitalization ($36.02) was 27% -- 37% less than the lowest and highest D&C patient costs ($49.16 and $57.62 respectively).

Also, as in Kenya, personnel costs were the second greatest contributor to average cost per patient, ranging from $32.67 to $38.30 per D&C patient, and $23.23 per patient at the MVA hospital. Even at Hospital MEX5, where both MVA and D&C were used, average staff costs for MVA patients were lower ($23.23 or 29% less) than for D&C patients ($32.67). Medical instrument cost per D&C patient ranged from $0.01 to $0.09; per MVA patient it was $0.33.

Ecuador

At Hospital ECU1 the average total cost per D&C patient was $3.06, compared with $4.35 and $3.66 per MVA patient at Hospitals ECU2 and ECU5, respectively (Figure 6 and Table 4). In contrast to the results from Kenya and Mexico, total patient costs in Ecuador were disproportionately affected by the expense of disposable supplies and the re-sterilization of MVA instruments, rather than staff and hospitalization. The cost of disposable supplies ranged from 25% - 58% of the total cost per patient. Re-sterilization of MVA instruments was 14% of total patient cost at ECU2 and 31% at ECU5. Staff costs ranged from 16% -- 27% of the total cost per patient and represented only a slightly smaller amount of the total cost for MVA patients than for D&C patients.

Figure 6. Average Total Patient Cost* in Ecuador, by Hospital and Type of Procedure



*Cost in U.S. dollars. US$1 = 1105 Ecuadorian Sucres.

Table 4. Average Cost of Treating a D&C or MVA Patient in Ecuador, by Hospital and Cost Category

Hospital and Type of Procedure	Number of Cases	Medical Instruments	Re-sterilization	Disposable Supplies	Drugs	Staff	SubTotal	Hospitalization	Total
ECU1 (D&C)	13	0.00 (NC)	0.00 (NC)	1.77 (58%)	0.36 (12%)	0.82 (27%)	2.95 (97%)	0.11 (3%)	3.06
ECU2 (MVA)	11	0.24 (6%)	0.62 (14%)	1.89 (43%)	0.41 (9%)	.68 (16%)	3.84 (88%)	*.51 (12%)	4.35
ECU5 (MVA)	3	0.30 (8%)	1.13 (31%)	0.93 (25%)	0.28 (8%)	0.96 (26%)	3.60 (98%)	0.06 (2%)	3.66

Costs in U.S. dollars; as of August 1991, US$1 = S/. 1105

* Indicates estimated cost

(NC) = not calculated

(%) = Percentage of average total cost by hospital

At Hospital ECU2 there were unusually long post-evacuation periods for MVA patients and a subsequently high hospitalization cost -- $0.51 compared to $0.11 at the D&C site (ECU1) but only $0.06 at the other MVA site (ECU5). Also, the cost of medical instruments and sterilization (which were not accounted for at the D&C site) caused the cost of treatment to be higher at the MVA sites than at ECU1. Twenty percent of the total average patient cost at Hospital ECU2 was attributed to instruments and sterilization, and 39% of the average total patient cost at ECU5 was attributed to these components. Differences in cost and resource use may be explained partially by the fact that the hospitals selected for data collection in Ecuador were administered by different public sector authorities.

Trends in Duration of Stay and Resource Utilization

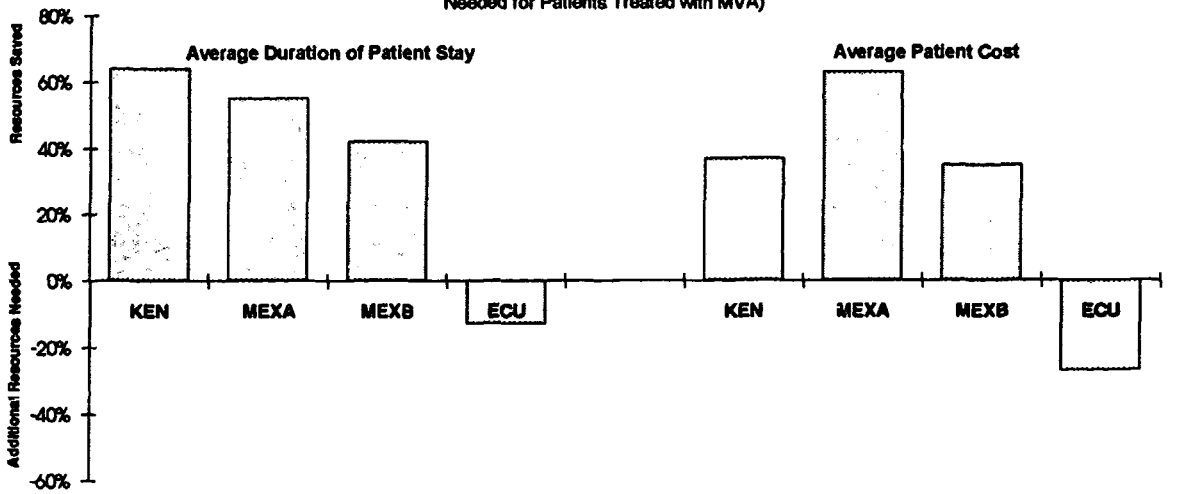
The results of the study show that, overall, patients treated for incomplete abortion with MVA spent less time in the hospital and consumed fewer resources than similarly diagnosed patients treated with D&C.

Figure 7 shows the percentage of monetary and time resources saved (or needed) by the implementation of MVA in place of D&C for the treatment of first-trimester incomplete abortion. Grouped data must be interpreted cautiously because of differences in the duration of stay and cost associated with a given procedure at different hospitals within the same country. These differences may be due to variations in administrative level of the hospital, staff efficiency, caseload and/or patient management. However, these grouped data show similar trends in resource savings as data from the individual study sites.

Figure 7 illustrates grouped patient data from hospitals in Kenya (KEN), Mexico (MEXa -- ward patients, and MEXb -- ambulatory-surgery patients) and Ecuador (ECU).

Figure 7. Trends in Duration of Stay and Resource Utilization for MVA Patients*

(Percentage of Resources Saved or Additional Resources Needed for Patients Treated with MVA)



*Based on comparisons of weighted means calculated for patients treated with D&C and MVA.

Discussion

Implications of Study Results

The results of this study demonstrate that use of MVA for treatment of incomplete abortion offers significant potential benefits for women, service providers and healthcare systems. A close examination of the current practice of MVA and D&C at nine sites in Kenya and Mexico showed that MVA required fewer resources than D&C for most of the cost elements studied (staff, drugs and hospitalization).

Effective adoption of MVA within a hospital or healthcare system requires decision and commitment at the policy level, followed by certain pragmatic adaptations such as developing mechanisms for procurement of medical instruments and training practitioners. The study results -- especially those from Ecuador -- also highlight the influence of patient-management practices on resource utilization, suggesting that the full benefits of MVA can be realized only if adoption of the technique is accompanied by changes in these protocols. Another policy that can contribute significantly to reducing resource consumption and improving women's health is decentralization of abortion care to lower levels of the healthcare system. While this change is not a necessary condition for use of MVA, introduction of the technique can greatly facilitate access to abortion care.

Comparative Costs of D&C and MVA

The potential economic benefit of a shift from D&C to MVA is most clearly illustrated by the before-and-after design of the study at KEN1 and KEN2. Based on the resource-use data collected during the study, KEN1 and KEN2 would seem to represent two hospitals at either extreme of the cost continuum.

Approximately 780 patients were treated for first-trimester incomplete abortion at Hospital KEN1 in 1990. If one assumes an average savings of $0.90 per patient (cost differential between MVA and D&C), the potential resource savings to the hospital following the implementation of MVA would be approximately $702. At the other end of the resource-use continuum, Hospital KEN2 had approximately 570 patients treated for incomplete abortion in 1990. If one assumes an average savings of $10.01 per patient (cost differential between MVA and D&C), the potential resource savings to the hospital after implementing MVA would be approximately $5,706. The continuing need to treat a small percentage of severely complicated cases in the operating room using increased pain-control measures with MVA would likely reduce these savings slightly.

The majority of public hospitals in Kenya probably fall somewhere between KEN1 and KEN2 in terms of resource-use efficiency and hospitalization protocols. With 50 public hospitals in Kenya, considerable monetary savings could potentially result from the widespread use of MVA.

Results from the study sites in Mexico also demonstrate the potential for reductions in cost associated with treatment of incomplete abortion. At Hospital MEX5, MVA costs were, on average, $77.52 (per patient) less than D&C costs for patients who recovered in ambulatory surgery. With approximately 600 first-trimester incomplete abortion patients annually, all other factors remaining equal, the potential resource savings would be approximately $46,512 per year.

Although resource savings are often calculated in dollars (or local currency), actual monetary savings may not be apparent because the resources "saved" are often immediately consumed by other operating expenses in a given hospital or healthcare system. However, when consumption of resources such as time, space, personnel, drugs and supplies is reduced for treatment of incomplete abortion, these resources may at least be redirected to maternity services, post-abortion family planning, and other ob-gyn needs.

Policy and Protocol Decisions Required for a Change from D&C to MVA

What is needed to realize decreases in duration of stay and resource use is, foremost, the decision by policymakers (ideally at the highest level of the healthcare system) to adopt MVA for treatment of first-trimester incomplete abortion. The basic requirements for introduction of the technique are purchase of the MVA instruments and adaptations in training and certain other procedures. Changes in patient-management practices, such as moving treatment out of the operating room, are essential to achieve greatest resource savings; however, even implementing these changes incrementally can have positive outcomes. The policy decision to decentralize abortion care can reinforce the advantages accrued from adopting MVA, potentially leading to significant resource savings and simultaneous improvements in quality of care.

Purchase of MVA Instruments

A major policy concern related to any change in technology is its cost. For both Kenya and Mexico the total cost savings of MVA procedures more than offset any expenditures for initial purchase or replacement of instruments and re-sterilization.

The initial cost of introducing MVA may appear significant because introduction of the technology (like any other technology) requires new expenditures, whereas most hospitals already have D&C instruments and they are less frequently replaced. Although experience has shown the syringes and cannulae to be extremely durable, given adherence to proper disinfection and re-sterilization procedures, MVA instruments must be replaced periodically. For this study, the replacement cost of MVA instruments was based on the projected use of syringes for 50 procedures and cannulae for 20 procedures. IPAS' colleagues throughout the developing world report that both MVA syringes and cannulae are actually often used safely much longer; for example, syringes are sometimes used for hundreds of procedures.

The proportion of average total patient cost attributable to MVA instruments and re-sterilization varied widely among the three countries (1% in Mexico, 9%-16% in Kenya, and 20-39% in Ecuador). This is partially explained by the fact that researchers used the same MVA instrument prices in all countries but did not compensate for differences attributable to inter-country variations in supply, drug, staff and hospitalization costs. Thus, in Mexico where wage and commodity prices are more similar to those in the United States, the proportion of cost attributable to MVA instruments is less than in Kenya and Ecuador.

Training and Procedural Adaptations

In addition to purchasing MVA instruments (initially and for replacement), hospital administrators and clinicians should be prepared to organize didactic and practical training seminars for physicians and

nurses, which will require obtaining related instructional materials. Modifications in protocols for treatment will also be required. For example, healthcare providers should be trained in the use of appropriate pain-control measures since MVA usually requires different types and/or lower dosages of pain control than D&C. Incorporation of new procedures for achieving high-level disinfection or re-sterilization of the instruments will also be necessary.

Patient-Management Issues

During this study, the process of data collection highlighted a number of issues associated with the way in which incomplete abortion patients were routinely managed in hospital settings. The results suggest that patient management is the primary factor that contributes to the different levels of resource utilization required for the two procedures, affecting the time patients spend in the hospital [cf. 23] as well as costs to the healthcare system. The findings from Ecuador show that technological change alone will not necessarily reduce the human and material resources required for the treatment of incomplete abortion. The maximum benefits of MVA are realized only when adoption of the technique is accompanied by changes in patient management, such as those suggested in this paper. Incremental benefits of MVA may be seen even when these changes are incorporated gradually.

Specifically, the results from Ecuador show that inefficient patient-management protocols can negatively affect the time and cost data for MVA. In Ecuador, patients who were treated for incomplete abortion with MVA at two different hospitals (ECU2 and ECU5) had two very different experiences. At Hospital ECU2, patients had an average pre-evacuation wait of 2.39 hours; following the MVA procedure they remained in the hospital for an average of 10.58 hours for a total stay of almost 13 hours. Conversely at Hospital ECU5, patients waited an average of only 1.2 hours for treatment and remained in the hospital approximately 30 minutes following the procedure. This example suggests the importance of efficient management of the time women spend in the hospital but does not address the issue of quality of patient care which can be compromised at both ends of the time and cost continua.

Healthcare administrators should note that while many changes in patient management are not exclusive to MVA (i.e., improvements can be made in how both services are offered), many are facilitated by MVA. For example, both D&C and MVA procedures could theoretically be managed as outpatient services with similar resource expenditures. However, it is unlikely that D&C can be performed *more* efficiently or at a *lower* cost than MVA. D&C is a more institutionalized medical technique than MVA, and providers may be less inclined to move it from the operating-room setting where it has been traditionally practiced. MVA, on the other hand, was designed to be performed in an outpatient setting.

In this study, three interrelated management components were notable for their impact on patient flow. They were location of the evacuation procedure, the level of priority given to incomplete abortion patients and hospital discharge protocols. Following is a discussion of these factors along with suggestions about how the use of MVA combined with changes in hospital protocols and policies could improve the quality of abortion care as well as the utilization of resources.

Location of the evacuation procedure. In many hospitals, the operating room is a bottleneck for patient flow. This was especially true for D&C procedures in Kenya, where demands for operating-room space and associated difficulties in scheduling resulted in long pre-evacuation waits (an average of 25.5 hours in Hospital KEN1 and 90.2 hours in Hospital KEN2). In Kenya, MVA was performed

in treatment rooms in gynecology wards; thus, scheduling the procedure did not depend on the availability of the operating room. Clearly, these practices resulted in reduced average pre-evacuation waiting time, to the benefit of both patients and hospital staff (for example, an average of 11.6 hours in Hospital KEN1 and 10.7 hours in KEN2 -- a decrease of 55% and 88% respectively).

Among the Mexican hospitals, pre-evacuation times did not vary markedly. This probably related to the fact that all patients, whether treated by D&C or MVA, followed the same administrative protocol up through the evacuation procedure in the ob-gyn surgical unit. However, the average total stay for MVA patients was much briefer than for D&C patients in MEX5 and was also less than at other D&C sites in Mexico. The shorter average stay for MVA patients in Mexico was probably attributable to differences in pain control; the use of a paracervical block instead of heavy sedation allowed women to recover more rapidly and thus leave the hospital sooner.

MVA patients at Hospital ECU5 in Ecuador required the shortest patient stay for any site in the study. This was attributable to the outpatient management of the procedure. Women remained in the emergency room from admission to discharge, and paracervical block was provided for pain control, allowing women to recuperate quickly.

Location of the procedure was a critical factor in duration of stay at all study sites. It is likely that additional changes -- specifically, offering MVA in an outpatient setting at those sites which do not already do so -- would lead to further decreases in average patient stay and cost.

Level of priority given to incomplete abortion patients. In most study hospitals, unless a woman was admitted in a life-threatening condition, hospital staff gave relatively low priority to incomplete abortion cases. Patients without severe complications were often not attended immediately because of the high volume of abortion and other ob-gyn cases and the resulting demand for operating-room space. Other reasons noted by researchers for the low priority include negative attitudes among some providers toward women who sought abortion.

New patient-management protocols will not resolve all the problems that contribute to making patients treated for incomplete abortion a low priority, especially negative provider attitudes. However, they can mitigate the stresses on often overwhelmed hospital resources and staff and thus facilitate improvements in general conditions at the facility, provider attitudes and the overall quality of care patients receive.

Hospital discharge protocols. Discharge protocols affect the length of hospital stay and consequently the use of hospital resources. For example, D&C patients at Hospital KEN1 were not allowed to leave until a physician had signed the appropriate papers, which often did not occur until morning rounds the day after the procedure. This policy may have been a factor in the average post-evacuation stay for D&C patients at Hospital KEN1 (15.4 hours), which was longer than at any other facility in Kenya. In contrast, physicians at other hospitals in Kenya signed discharge paperwork immediately after the procedure, and patients were technically free to leave when they felt able.

In Mexico, except in one hospital, patients could be discharged only during a specific period each morning and afternoon. Patients at Hospital MEX3 could usually be discharged only in the morning; not coincidentally, the average post-evacuation stay for patients at MEX3 was 25 hours -- longer than at any other facility.

In Ecuador, abortion patients at Hospital ECU2 were kept in the hospital for an unusually long time following the procedure (10.58 hours versus 3.65 hours at ECU1 and 0.51 hours at ECU5), apparently primarily for administrative reasons. This discharge practice caused MVA patients to remain in the hospital for a longer period of time (and thus require more hospital resources) than D&C patients at Hospital ECU1.

Discharge protocols are affected by the recovery time required by clients who have undergone a particular procedure. As the two procedures are practiced in the developing world, MVA is usually performed with lower levels and/or different types of pain control than D&C. As a result, less intense post-operative monitoring is usually required; physicians can often authorize discharge immediately following the procedure and patients may leave as soon as they feel able. When a longer stay is required -- regardless of the evacuation procedure used -- hospital protocols that allow patient departures more than once a day can reduce the post-evacuation stay, as was seen in Mexico.

Decentralization

The policy decision to decentralize abortion care can significantly enhance the benefits that can be derived from adoption of MVA. The decision to decentralize requires a series of policy changes so that MVA services can be offered safely and effectively at lower levels of the healthcare system. These changes include establishing mechanisms to ensure a continuous supply of commodities, training and supervising providers at these lower levels, and developing and using protocols for the management of varying degrees of abortion complications.

Outcomes of Policy Changes Related to the Treatment of Incomplete Abortion

Changing policy to support adoption of MVA can lead to numerous beneficial outcomes. This study focused on documenting the resource savings associated with replacing D&C with MVA. Reduced resource consumption can have significant implications for the quality of care, both for treatment of incomplete abortion and other reproductive-health needs. Use of MVA offers the potential to improve the quality of abortion care in several important ways, including:

- decreasing the time women must wait to receive care and the time they spend recuperating from treatment for incomplete abortion;
- allowing reallocation of staff time and resources to other needs (for example, maternity services); and
- improving the accessibility of treatment services.

Reducing waiting times. An important advantage for women treated with MVA is the shorter hospital stay usually required. Women can be treated sooner if they do not have to wait for an operating room to become available. Prompt treatment can decrease the risk associated with abortion complications. Women's total hospital stay is further reduced because often they can avoid an overnight stay. A shorter hospital stay has direct benefits for the woman: she can return home sooner and potentially has to pay less in patient fees and other out-of-pocket expenses.

One factor that can contribute significantly to the shorter hospital stay associated with MVA is the reduced level of pain control required. In certain circumstances, use of MVA can further enhance quality of care by allowing women to remain more involved in their care, if they are encouraged by an

empathetic service provider. The use of reduced pain-control measures also allows treatment to be moved out of the operating room.

Resource reallocation. Use of MVA can allow reallocation of resources such as time, space, personnel, drugs, and supplies to other ob-gyn and abortion-patient needs. Specifically, resource savings could be redirected to post-abortion family planning programs, maternity care, and/or other reproductive healthcare services. This would improve the facility's overall quality of care by improving its ability to meet a range of women's needs.

Improving accessibility of services. If implemented through a decentralized service delivery system, MVA offers the opportunity to improve the accessibility of abortion care, bringing lifesaving services closer to women in underserved areas. Although WHO includes VA as an essential element of abortion care at the first referral level, decentralized abortion care has not yet been implemented on a wide-scale basis. In developing countries, treatment for incomplete abortion is usually delivered at secondary or tertiary level healthcare facilities, with D&C performed in the operating room. With the proper equipment and trained staff, morbidity and mortality related to unsafe abortion can be reduced by providing emergency services for many women at lower levels of the healthcare system [30].

The use of MVA in an outpatient setting shows the potential for decentralizing MVA services so that women can receive essential care even more quickly. For reasons mentioned above, the practice of MVA can be more easily decentralized to lower levels of the healthcare system than D&C. It is important to note, however, that regardless of the level of decentralization of abortion care, there will continue to be a certain small percentage of complicated cases that will require more complex approaches to care, including referral to higher levels of the system.

The Status of Policy Change in Kenya, Mexico and Ecuador

The findings of this study have already contributed to policy changes underway at hospitals and/or healthcare systems in Kenya, Mexico and Ecuador and have informed discussions with Ministry of Health representatives from Zambia and Zimbabwe regarding the development of plans for sustainable MVA programs.

Kenya: Incomplete abortion is a significant public health problem and a major drain on Kenya's healthcare resources. In July 1991, a workshop brought together members of the Kenyan Ministry of Health (MOH), district hospital gynecologists, faculty from Kenyatta National Hospital (KNH -- the country's tertiary-care teaching hospital) and representatives of various donor agencies. Presentations were made the findings of this study, on the safety and effectiveness of MVA, and on the experiences of KNH and some district hospitals currently using the technique for treatment of incomplete abortion. The primary outcome of the meeting was the formation of an MOH Task Force to develop a plan for the expansion of MVA training and services to all district hospitals. Since the workshop, the Ministry has prepared such a plan to assume responsibility for country-wide implementation of MVA training and services at the district level, in collaboration with the Department of Obstetrics and Gynaecology at KNH. In addition to being presented at the MOH workshop, the study results have been widely disseminated within the country, including to participants at the 1992 annual meeting of the Kenyan Obstetrics and Gynaecology Society.

Mexico: The study results from Mexico were an important factor in the decision by the Instituto Mexicano del Seguro Social (IMSS) to introduce MVA training and services in the healthcare system. The initial steps to eventual system-wide adoption of the aspiration technique for treatment of incomplete abortion include a training of trainers for medical, nursing, and social work staff from three key hospitals and the development of updated technical and administrative guidelines for abortion care. A report of the findings has also been distributed to a number of decisionmakers in the healthcare systems of Mexico.

Ecuador: The chief administrator at Hospital ECU2 -- where the study results indicated that the hospital stay for MVA patients seemed unnecessarily long -- has agreed to review the recovery protocols for these patients, recognizing that the modification of inefficient practices would reduce hospitalization costs at this facility. The study results were also presented at a May 1992 workshop on the impact of abortion on the Ecuadorian healthcare system organized by the Corporación de Investigación Social y en Salud (COINSOS), IPAS and Columbia University. Meeting sponsors were the Pan-American Health Organization (PAHO), the United Nations Population Fund (UNFPA) and IPAS. Participants included Ministry of Health officials, hospital staff and representatives of international and local organizations. Conference recommendations include replacing sharp curettage with vacuum aspiration.

Conclusion

The results of this study demonstrate that a change from D&C to MVA can have positive benefits for both clients and providers of emergency abortion services and allow for more efficient use of hospitals' and healthcare systems' resources. Adoption of MVA for treatment of abortion complications was shown to reduce duration of hospital stay and consumption of resources.

Commitment at the policy level to adopt MVA must be followed by the fundamental steps of procuring instruments and initiating clinical and administrative protocols required by the new method. These include:

- training staff in use of the method;
- adopting new instrument sterilization procedures;
- implementing appropriate pain-control practices.

This study also suggests that incorporation of certain patient-management practices in conjunction with the introduction of MVA is essential for realization of the full advantages of the technique. Examples of these include:

- performing procedures in a treatment and/or emergency room instead of the main operating room; and
- modifying discharge protocols to eliminate needless waiting.

Furthermore, decentralizing care to lower levels of the system can maximize the benefits of MVA by improving accessibility of care. A significant implication of this study is MVA's potential impact in improving the quality of care that women receive for treatment of abortion complications while also conserving scarce health-system resources.

Appendix 1

Study Sites

Kenya

In Kenya, four Ministry of Health hospitals participated in the study. Two (KEN1 and KEN2) were large district hospitals (340 and 324 beds respectively) where D&C was the standard practice for uterine evacuation in cases of incomplete abortion. After data had been collected for D&C patients at KEN1 and KEN2, MVA was introduced and subsequently became standard treatment for first-trimester incomplete abortion. The project staff later returned to these hospitals to collect data on MVA patients.

At the other two sites (KEN3 and KEN4), MVA was the standard treatment for first-trimester incomplete abortion. Hospital KEN3, a 272-bed facility, was chosen because it exemplified a small, overcrowded district hospital where MVA was practiced. Hospital KEN4, a 2,000-bed teaching hospital, was selected because MVA has been used there for a longer period of time than at any other site in Kenya.

At hospitals KEN1, KEN2 and KEN3, physicians treat between 500 and 800 first-trimester, incomplete abortion patients per year; at KEN4 approximately 3000 patients are treated annually. D&C procedures were performed in central operating rooms with light sedation, followed by overnight patient stays. MVA procedures were done in treatment rooms in the gynecology ward; verbal reassurance was given in lieu of pain control, and patients left the hospital when they felt physically able.

Mexico

In Mexico, researchers chose to work within the Mexican Social Security System (IMSS) because of its exemplary record-keeping practice and its nationwide influence on healthcare policy. At four hospitals in the Mexico City area (MEX1, with 240 beds; MEX2, 144 beds; MEX3, 441 beds; and MEX4, 244 beds), incomplete abortion patients were treated with D&C. At the fifth hospital (MEX5, a 282-bed facility located in a western state), both D&C and MVA were used, depending on the training and preference of the physician who performed the evacuation.[6]

The number of patients treated with MVA during the observation period at Hospital MEX5 was unexpectedly low. At the time the study was initiated, MVA had been implemented within the IMSS system only in two western states. Several smaller IMSS hospitals in those two states were excluded from the project because of low caseloads and logistical difficulties entailed in conducting a study so far from Mexico City. Three hospitals (MEX1, MEX2, MEX4) were classified as secondary level facilities; two (MEX3 and MEX5) were specialty hospitals at the tertiary level. Admissions per year for first-trimester incomplete abortion ranged from 500-600 (MEX2 and MEX5) to 1,700-2,700 (MEX1, MEX3, MEX4).

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[6] At the time of data collection, some resident physicians at Hospital MEX5 had not yet been trained in MVA and therefore continued to use D&C.

In Mexico, most incomplete abortion patients were admitted as inpatients and treated in ob-gyn surgical units (*tococirugía*), which consisted of an admission/examination room, a labor room, a surgical or evacuation room, and a recovery room. Uterine evacuations were usually performed in a gynecology surgical room. At tertiary level facilities, separate rooms were also available exclusively for D&C patients (and at Hospital MEX5, MVA patients as well). The most important differences between MVA and D&C procedures were pain-control measures and in some cases recovery protocols. Heavy sedation was used with D&C and paracervical block with MVA. After the D&C procedure, patients in Hospital MEX1 were taken to the gynecology ward for recovery; in Hospitals MEX2 and MEX4, they remained in the recovery area (ambulatory surgery) until they were discharged. In the two specialty hospitals (MEX3 and MEX5), the protocol for D&C patients varied: patients were either sent to the ward or remained in the ambulatory surgery area and were subsequently discharged. At MEX5 all MVA patients recovered in the ambulatory surgery area.

Ecuador

In Ecuador, researchers collected data at five hospitals; however, the analysis focuses on only three (ECU1, with 220 beds; ECU2, 295 beds; and ECU5, 45 beds) because of very low caseloads at the others (ECU3 and ECU4 had only one case each [see footnote 4]). Two hospitals (ECU1, a D&C site, and ECU2, an MVA site) are part of the federal Ministry of Health system; one (ECU2) also receives support from the country-wide lottery via the National Welfare Board; and one (ECU5, an MVA site) is supported by a municipal government.

All three hospitals are located in major cities, two of them (ECU1 and ECU5) in the capital, Quito. Two sites (ECU1 and ECU2) are large maternity hospitals, where approximately 2,000 incomplete abortion patients are treated per year. The third site (ECU5) is a general facility with an estimated caseload of 150 incomplete abortion patients annually.

At Hospital ECU1 major renovations occurred during the data-collection period. Patients recuperated in the evacuation room, in a side room or in the hallway. At Hospitals ECU1 and ECU2, D&C and MVA patients were treated similarly except for pain control and recovery. Heavy sedation was used for D&C patients while MVA patients received paracervical block, and in some cases, heavy sedation. The unnecessary use of heavy sedation for some MVA patients in Hospital ECU2 probably reflects the general unfamiliarity with and lack of acceptance of the use of paracervical block among some Ecuadorian physicians. In Hospital ECU5, the entire process from admission to discharge took place in the emergency room and paracervical block was utilized.

Appendix 2

Variations in Data Collection and Explanation of Cost Determinants

Data-collection techniques most closely followed the original research design in Kenya, where over a seven-day period all patients admitted for treatment of first-trimester incomplete abortion were directly observed from admission until discharge in each of the study hospitals.[7] Variations in data-collection procedures in Mexico and Ecuador were due principally to three factors: 1) unexpectedly low caseloads in some hospitals; 2) logistical difficulties arising from one person following numerous patients; and, 3) differences among hospitals in management protocols and physical layout.

In Mexico, data collection occurred daily between 8 a.m. and 5 p.m.; in the absence of continuous observation, supplemental data were obtained from chart reviews, other hospital records, and/or averages verified by actual observations. The caseloads of patients with incomplete abortion at some hospitals were lower than expected. At Hospital MEX5 project staff supplemented direct observations of MVA patients with information from the patient charts and hospital records of all first-trimester, incomplete abortion patients from the beginning of the month in which data were collected. The IMSS system's high-quality record-keeping practices greatly facilitated this endeavor.

In Ecuador, patients were observed from approximately 8 a.m. until patients were discharged in the evening. In several Ecuadorian hospitals, however, a small number of patients who were admitted and treated in the middle of the night were excluded from observation.

A data-collection table was modified for each site so that field staff could document the progress through the hospital of an incomplete abortion patient in discrete stages/activities, from registration to discharge (for example, in Kenya, one hospital had 15 stages, another had 21 stages). The table included columns to classify the staff who had contact with patients, amount of staff time spent with the patient and salary range by personnel category. A blank space at the bottom of the chart was used to record the presence of septicemia or other complications,[8] the number of nights the patient spent in the hospital and the number of times nurses took vital signs during her stay.

Cost and time data were collected for each of the following cost determinants:

Medical instruments: In many countries D&C instruments are used over the course of many years. The cost of these instruments was considered non-existent in Kenya and Ecuador and was amortized over the projected life of the instruments in Mexico. The effect of not calculating D&C instrument cost for Kenya and Ecuador was to underestimate the total instrument cost in sites where D&C is practiced. MVA instrument cost in all three countries was calculated based on prices charged to Ministries of Health; per-patient costs were based on 20 uses per cannula and 50 uses per vacuum syringe.

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[7] **Admissions were recorded and monitored 24 hours per day in Kenya.**

[8] **Once septicemia or other complications were detected, the patient was excluded from the study.**

Re-Sterilization: This category included the cost of solutions (for example, glutaraldehyde) for the re-sterilization/high-level disinfection of MVA instruments in all countries and the use of an autoclave to restore D&C instruments to reusable condition in Mexico. Cost of disinfectants was obtained from (hospital) central medical stores; unit pricing was calculated according to amount used per MVA patient. In Mexico, accounting records enabled calculations of unit re-sterilization costs for D&C patients. Such records were not available and thus not used for the calculations of patient cost in Kenya and Ecuador. As in the category above (medical instruments), exclusion of the cost of re-sterilization for D&C instruments in Kenya and Ecuador had the effect of underestimating the overall cost of D&C in those countries.

Disposable supplies: This category included the cost of all materials such as cotton gauze, disinfection agents, intravenous solutions, needles and syringes. Cost information was obtained from central stores; unit pricing was calculated according to the amount used per patient.

Drugs: This category included sedatives, analgesics, antibiotics and uterotonics. The cost of drugs was obtained from central stores or hospital pharmacies; dosages recorded during patient observations were used to calculate cost per patient.

Staff: Personnel were subdivided according to tasks performed. Primary personnel included those who actually performed MVA or D&C procedures; secondary personnel included all people who provided direct support to the primary personnel (for example, anesthesiologists, nurses, attendants, orderlies, counselors); tertiary personnel included persons associated with patient care but not directly involved with medical procedures (such as overnight ward nurses, kitchen and janitorial staff).

Personnel costs were calculated by prorating salaries and benefits for the time (in minutes) spent per patient. In most cases, salary information was obtained from published personnel schedules of the respective healthcare systems. In Kenya, the mid-point of a given personnel pay category was used; in Mexico and Ecuador a base rate was used to calculate cost per minute.

Hospitalization: Costs in this category varied by country, both in definition and calculation.

In Kenya, detailed hospital budgets for fiscal year 1990-91 were obtained at four sites. Budget items included patient meals, clothing, linen, water, electricity, and cleaning materials. Costs of vehicle purchases and maintenance, building maintenance, and office equipment and maintenance were not included. Daily hospitalization costs per patient were prorated and multiplied by the average patient stay at each hospital.

In Ecuador, daily hospitalization rates were calculated the same way as in Kenya. The budget items in Ecuador were: laundry, meals, electricity, water, ambulance, gasoline, and cleaning materials.

In contrast to Kenya and Ecuador, hospitalization costs in Mexico were applied post-procedure only. Direct and indirect hospitalization costs were considered as an "integrated" cost, which included salaries, disposable materials, medication, food and utilities. Hospitalization costs were prorated by average length of patient stay.

Costs appeared to be correlated with the amount of time spent in the hospital by the abortion patient in all three countries; however, a correlation analysis was not performed.

Hospital policies and clinical protocols: Standard operating procedures and clinical protocols for the management of patients treated for first-trimester incomplete abortion were described for each site. This information allowed researchers to assess policy-related (non-medical) factors that might increase the time spent in the hospital by abortion patients.

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