



MotherCareTM Matters

A QUARTERLY NEWSLETTER AND LITERATURE REVIEW ON
MATERNAL AND NEONATAL HEALTH AND NUTRITION

IMPROVING OBSTETRICAL AND NEONATAL MANAGEMENT: LESSONS FROM GUATEMALA

Section 1—Hospital Training and Its Effect
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Introduction

With this issue of *MotherCare Matters*, we continue with our review of MotherCare's projects during the first phase of the project, 1989-1993. (See *MotherCare Matters*, Volume 5, No. 1, for the demonstration projects in Indonesia.) The demonstration projects implemented during MotherCare I focused on the design and testing of interventions to reduce maternal and perinatal mortality and related morbidities. These interventions address the steps on the Pathway to Survival for Women and Newborns, outlined at right.

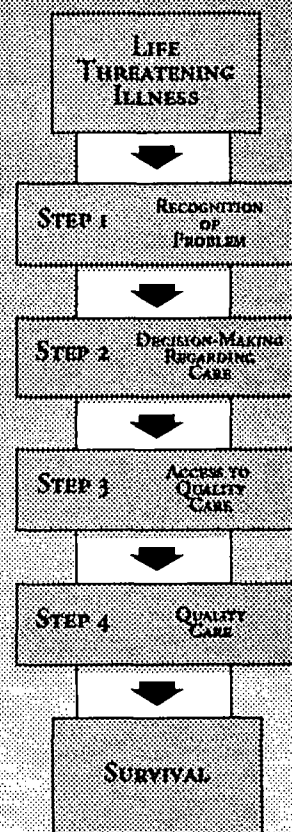
Beginning at the point where an obstetrical or newborn complication occurs, there are four major steps that require attention in order to promote the survival of a woman or her baby. Step 1 is recognition of the life threatening complication by the woman, her family, traditional birth attendant (TBA) or other provider in attendance who cannot manage the complication. Step 2 is the decision to seek care, typi-

cally made by family members other than the woman if she is in poor condition. Once the problem is recognized, impediments to accessing services must be overcome, such as distance, lack of or cost of transport, geographical or weather constraints, perceived poor quality or attitude of the providers (Step 3). These same problems also weigh heavily on the decision to seek care (Step 2). The last step is the quality of care available and provided once services are accessed. Death of a woman, fetus or newborn is more likely to ensue if one of these steps is not taken.

To explore the steps in the Pathway to Survival in depth, this issue of *MotherCare Matters* reviews the interventions and results from the Quetzaltenango Maternal and Neonatal Health Project. This project was implemented in Guatemala under the direction of Dr. Barbara Schieber and her staff of the *Instituto de Nutrición de Centroamérica y Panamá* (INCAP).

Guatemala has the third highest maternal and infant mortality

PATHWAY TO SURVIVAL— MATERNAL/PERINATAL MORTALITY



in the Western hemisphere after Haiti and Bolivia. The maternal mortality ratio for Guatemala is estimated at 200 per 100,000 live births and the infant mortality rate at 51 per 1000 live births, with higher rates in the rural highlands (WHO and UNICEF, 1996; DHS Preliminary Report, 1995). At least 31% of all infant deaths occur within the neonatal period (OPS, 1986). Recent community-based data from the Quetzaltenango Health Area show a perinatal mortality rate of 23.2 per 1000 total births and a neonatal mortality rate of 16.7 per 1000 live births (WHO, 1996; Schieber and Szasdi, 1994).

The TBA is the primary provider of maternity care for Guatemalan women. The majority of Guatemalan women give birth at home with the TBA in attendance. An estimated 20,000 TBAs attend 60-70% of all births; this percentage rises to over 90% in the rural areas.

Guatemala has the institutional capacity to provide formal medical services to approximately 20% of all women giving birth. Obstetric expertise does not exist outside the hospitals although prenatal and child care are offered by nurses and nurse auxiliaries at health posts and health centers. Midwifery was abolished in Guatemala twenty years ago. There are few outreach MCH or midwifery services from the health posts or health centers into the community and thus there is no exchange between formal health care institutions and the TBA. Women prefer to avoid the hospital as they feel that their needs, including such issues as respect, proper attention, and considerations of language barriers, are not met there. This leaves the bulk of maternity care in the hands of the TBA.

The Quetzaltenango Maternal and Neonatal Health Project was developed by INCAP with MotherCare to improve obstetrical and neonatal services and ultimately to impact on maternal and neonatal outcomes. Objectives of the project and their

relationship to the four steps of the Pathway to Survival were as shown at below.

In addition, an objective was set to measure the process of project implementation and of the effectiveness of project activities on maternal and neonatal outcomes.

To this end, a treatment and control area with a population of approximately 165,000 was selected in the health zone of Quetzaltenango for the study, and protocols for recognition and referral or management of complications were developed and implemented. A sensitization campaign was implemented among health providers to foster good working relations between them, including with the TBAs. Changes were made in the hospital with respect to temperature control in the nursery, cot nursing, guidelines for clothing sick neonates and infection control. A medical audit of neonatal management was carried out retro-

Objectives	Pathway to Survival steps addressed
to improve TBAs' ability to recognize obstetrical and neonatal complications and respond to them through a 3-day training	Steps 1 and 2— Recognition of Complications and Decision Making
to improve relationships between hospital personnel and TBAs and the women they refer	Steps 1, 2 and 3— Recognition, Decision Making, Logistics
to supervise health post and health center staff by project personnel	Step 4— Quality of Care
to develop norms and protocols for the detection and management of maternal and newborn complications at health posts, health centers and the referral hospital	Step 4— Quality of Care
to improve the detection, management or referral of complications at the health post, health center and hospital levels through orientation of staff to the norms and protocols	Step 4— Quality of Care

spectively to measure the impact of all these changes. 400 TBAs were trained in timely recognition and referral of maternal and newborn complications including bleeding, swelling of hands and face during pregnancy, malpresentation, prolonged labor, retained placenta, depressed newborn breathing, postpartum bleeding and maternal and neonatal infections.

The Quetzaltenango Maternal and Neonatal Health Project was initiated in July of 1990 and continued through August of 1993, during which there were 4031 births monitored through 6 monthly community surveys.

This issue of **MotherCare Matters** specifically looks at the Quetzaltenango results to address step 4 of the Pathway to Survival on Quality of Care; and steps 1, 2 and 3 of the Pathway which taken together address "access" to care, by asking the questions:

- ◆ Do improvements in the quality of care at the referral facility improve outcomes of pregnancy?
- ◆ Does TBA training help to increase detection and referral of women and newborns with complications to the improved facility?

This issue also continues a commitment to presenting overviews of the results of our various field projects to our readers. We share these findings and experiences of our work to you in hopes that the lessons learned provide information useful for others working in maternal health endeavors around the world.

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Director, MotherCare

Our appreciation extends to Deborah Gordis, a consultant with MotherCare, who abstracted the three articles on the Guatemalan project.

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SECTION ONE

HOSPITAL TRAINING AND ITS EFFECT

The Effect of Hospital Staff Training on Management of Obstetrical Patients Referred by Traditional Birth Attendants.

K. O'Rourke. 1995. International Journal of Gynecology and Obstetrics 48 Suppl. S95-S102.

One component of the Quetzalténango Maternal and Neonatal Health Project was the training of hospital staff at the *Hospital General de Occidente San Juan de Dios*, the primary referral hospital for obstetrical patients in the Quetzaltenango health area.

As approximately 80% of women in this area of Guatemala deliver at home with a traditional birth attendant (TBA), referral hospital staff are better able to manage obstetrical/newborn complications if a TBA's referral occurs in a timely manner. Delays by TBAs in referring patients as soon as a complication is identified can result in decreased ability of the hospital staff to provide health care with good outcomes. Furthermore, if patients admitted to the hospital do not have good outcomes, the TBAs' decision not to refer patients may be reinforced.

A pre-intervention survey (Schieber and Delgado, 1993) conducted in the project area determined that many women preferred not to be cared for in the referral hospital. The primary reasons given were that people die there; women will be operated on or sterilized; the language barrier; and maltreatment. In another survey (Schieber and Delgado, 1993) also conducted prior to the implementation of the hospital training program, the majority of TBAs indicated that their patients had not received adequate support from the hospital staff.

The efficacious management of TBA-referred patients with complications can have a significant impact on the number of referrals as well as perinatal outcomes. MotherCare supported a study to examine the impact of a hospital staff training program on women referred to the hospital by TBAs.

Methodology

From March 1991 to November 1991, hospital staff were instructed for forty hours in standards of care for managing obstetrical and neonatal patients. Standards of care developed by specialists within the hospital with technical assistance emphasized clinical assessment of problems and proper treatment of maternal and neonatal complications. Medical chiefs, residents and nurses were instructed in the utilization of these protocols.

Hospital staff were also instructed in the importance of being supportive and understanding of TBAs and mothers referred by TBAs. First, health care personnel were taught about TBA practices and how they contributed to patient well-being. Secondly, TBAs were encouraged to visit the referral hospital and attend the deliveries of their patients. Posters were placed in hospital rooms to remind staff of the importance of treating TBAs and their patients with respect.

Training of TBAs to recognize complications and the need to immediately refer women or newborns with complications took place between March and May 1992. Data were collected by trained physicians on all TBA referred women from September 1990 through May 1993. Information was obtained through medical record review and the administration of questionnaires to the referred women during their hospital stay. A total of 844 women participated, including 705 women who were transferred to the hospital prior to delivery as well as 139 women who gave birth to their

infants at home and were subsequently transferred to the hospital for postpartum complications. Data were collected pre-training, during training and post-training of hospital staff in the protocols. A cross-sectional study design was followed comparing pre- and post-training data.

Results

Although absolute numbers were small (average of 6 referrals per month prior to hospital training), there was a >200% increase in the mean number of referrals from pre- to post-hospital training (average of 23 referrals per month post-hospital training). Statistical analysis of the data found that characteristics of women referred to the hospital did not vary significantly throughout the study. In general there was an increase in the numbers of women >30 years as well as for those with >5 pregnancies. However, with the exception of a statistically significant decrease in the percent of women with referrals for retained placenta, there was no change in the types of complications for which women were referred.

A regression analysis was performed evaluating both the effect of hospital and TBA training on the number of referrals. Results indicated a significant increase in the number of referrals following hospital training with no differences for women referred by trained or untrained TBAs. Thus, the most probable explanation of the increase in referrals was the hospital staff training program.

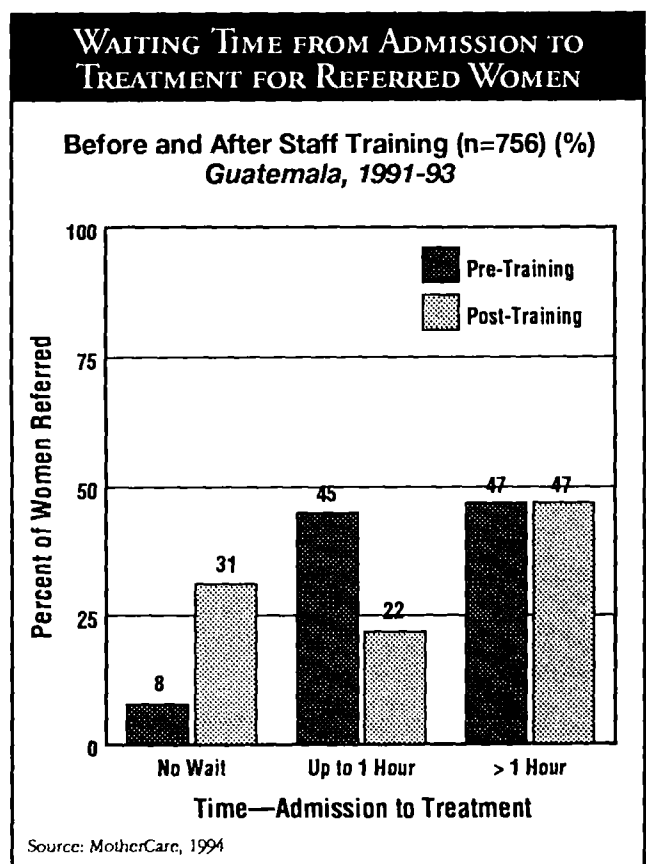
The effect of the hospital training program on patient satisfaction was measured by asking patients if they would return to the hospital another time. In pre-training, 79% of referred women indicated they would return; in post-training this figure grew to 94%. Infant mortality was a significant determinant of patient satisfaction with 94% of women with a live birth stating they would return as compared to 87% of women with an infant death.

The time between admission to the hospital and treatment decreased significantly throughout the training period. An analysis of changes in waiting time from pre- to post-training for specific complications revealed significant

diminutions in waiting time for women with retained placenta, postpartum hemorrhage and women for whom no complication could be identified. (See Figure 1).

The only obstetrical treatment to change significantly following the hospital training program was the increase in use of oxytocins, when all referred women with recorded data were compared. To clarify changes in cesarian sections and oxytocin usage, analyses were repeated on a subset of women with prolonged labor who were more likely to need these treatments. Use

Figure 1



of both treatments increased slightly but the values were not statistically significant due to small numbers.

With respect to perinatal outcomes, perinatal mortality decreased from before to after the hospital training program. However, this change was not statistically significant. (See Table 1). After excluding 11 miscarriages, 37 inevitable deaths and 139 births which occurred in homes of referred women, there

Table 1

PERCENT OF PERINATAL MORTALITY FOR INFANTS OF REFERRED WOMEN FROM PRE- TO POST-TRAINING (N=595)		
Study Period	Die n (%)	Live n (%)
Pre-training	10 (20.41)	39 (79.59)
Post-training	18 (14.84)	465 (85.16)

Chi-square = 1.078, 1 d.f., *P* = .299

Source: Adapted from O'Rourke, K. 1995

were 10 perinatal deaths of 49 births prior to hospital training (20%) as compared with 81 over 546 births (15%) after training. The most common diagnoses associated with mortality were malpresentation, prolonged labor, maternal exhaustion and preterm labor. These diagnoses were not mutually exclusive and 16 of 24 women who had prolonged labor also had an infant with malpresentation. One possible reason for lack of statistical significance is the condition of the fetus and/or mother prior to hospital admittance. Maternal deaths were too few to test significance. One- and five-minute Apgar scores also improved slightly but improvement was not statistically significant.

A multivariate analysis was conducted controlling for timing of referrals by TBAs (as stated by the mother) as well as whether a mother was cared for by a trained or untrained TBA. Late referrals by TBAs resulted in significantly increased perinatal mortality; whether or not TBAs were trained was not a significant factor.

Conclusions

The most striking result in the hospital training evaluation was a dramatic increase in the overall numbers of referrals. Since the overall birth rate for Quetzaltenango increased 3% per year, it would be extremely unlikely for the referral increase to be due solely to increased numbers of deliveries. Since the percent of increase was similar for both communities in which TBAs were trained and those that were not, it is not likely that this increase resulted from TBA training.

Long waits at the hospital were identified before the training as a reason for refusing

referral. Data on the waiting period may have been subject to recall bias as they were determined by comparing the difference between the time a patient indicated she arrived at the hospital and the time of treatment by hospital staff. After the training program, more women were seen immediately upon admission, but this change only affected the proportion of women who waited up to one hour. These were women for whom treatment must be rendered immediately - women complicated with postpartum hemorrhage or retained placenta. Both before and after training, approximately 40% of women waited over one hour for treatment.

The fact that infant mortality was lower for women who waited > 1 h for treatment provided some evidence that even prior to the training program hospital staff were prioritizing patients according to their medical urgency. The finding that, following hospital training, the percent of women seen immediately increased, while the percent who waited up to 60 minutes decreased—the time period with the highest infant mortality—illustrated that improvement occurred where it was most needed. While perinatal mortality rates remained similar for women who waited < 1 h, there were fewer women in this category.

Women who waited < 1 h for treatment were the least likely to state they would return to the hospital in the future. It is possible that these women had more serious complications and felt that they should have been seen immediately. In contrast, women who waited > 1 h for treatment were more likely to state that they would return in the future. This finding suggests that women may be more willing to wait

for treatment if they feel their situation is of lower medical urgency.

Analysis of mortality from pre- to post-training identified a decrease in perinatal mortality but this change was not statistically significant. This lack of significance does not mean that the program was ineffective, in terms of improving quality of care, but it may reflect the multi-causative factors which affect both Apgar scores and perinatal mortality, including many which happen prior to coming to the hospital.

Training of hospital staff can positively affect patients referred to the hospital by TBAs.

Improved patient satisfaction and changes in patient care, e.g. a decreased waiting period, provided an atmosphere in which TBAs were more willing to refer patients to the hospital and patients were more willing to accept referrals. These changes in hospital staff attitudes were more likely due to the efforts aimed at strengthening staff's positive attitude towards TBAs and the culture of birthing in their area than to the treatment protocols. However, all of hospital training probably raised awareness that improvements in care not only were needed but also that they could be effected.

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Medical Audit of Early Neonatal Deaths— INCAP/Quetzaltenango Maternal and Neonatal Health Project.

Barbara A. Schieber, MD, Mario Mejia, MD, Sara Koritz, MD, Carlos Gonzalez, MD with Barbara E. Kwast, MTD, MPH, Ph.D. January 1995. MotherCare Technical Working Paper #1.

The underreporting of perinatal/neonatal deaths is a serious problem throughout the developing world. Vital registration systems for documenting these events are inadequate in many countries, particularly where definitions are unclear and a stillbirth may be socially stigmatizing for the mother. Furthermore, in many countries a newborn is not recognized until it survives a period of time from one week up to 40 days when traditional naming ceremonies may take place.

Perinatal and neonatal mortality decline slowly in comparison with infant and child mortality because they are less sensitive to the effects of socioeconomic development or child survival

programs. They require targeted prevention strategies including the early diagnosis and treatment of specific medical conditions in the prenatal period and the improvement of labor and delivery management and early newborn/neonatal care. Community-based data from the Quetzaltenango Health Area at the time of the Maternal and Neonatal Health Project (1989-1993) show a perinatal mortality rate of 23.2/1000 total births and a neonatal mortality rate of 16.7/1000 live births (Schieber and Szaszdi, 1994).

The Intervention Area

The Hospital General San Juan de Dios in Quetzaltenango delivers about 3000 babies a year. Before the start of the Maternal and Neonatal Health Project, sanitary conditions were poor, rooms were overcrowded and premature infants were doubled up in incubators. Babies delivered by cesarian section were transported along open corridors from the operating room to the nursery. Resuscitation equipment was suboptimal. The breastfeeding policy was not fully supported. Diagnostic hospital studies carried out prior to the project showed that 96% of perinatal mortality was due to asphyxia secondary to malpresentation and

prolonged labor; neonatal sepsis; and complications associated with prematurity and low birth weight.

With the arrival of a specialist neonatologist on staff in 1990, the project developed norms and protocols for the management of obstetrical and neonatal conditions and oriented hospital personnel in the use of these norms in a two day session.

Infrastructural improvements were made in temperature control in the nursery, infection control, and breastfeeding support. Rooming in was also instituted. Specialized training was given in management of neonatal asphyxia. Quality assurance guidelines were instituted to monitor compliance with norms and protocols, and statistics on mortality and morbidity were collected to measure the efficiency of the protocol changes and neonatal health outcomes. In order to assess improvement in management after the training of hospital personnel, a medical audit of case management through record review was conducted.

Study Design

The sample was drawn from early neonatal deaths (from one to seven days) taking place at the hospital in 1989, 1991 and 1992; one year pre-intervention and two years following hospital training (which occurred from March through November of 1991). Thirty cases were selected for each year by random number. A total of 85 deaths were reviewed. The following cases were excluded:

- ◆ stillbirths;
- ◆ late neonatal deaths from 7-28 days (these preclude evaluation of obstetric management);
- ◆ neonates *not* delivered in hospital;
- ◆ neonates with congenital abnormalities which are incompatible with life;
- ◆ neonates weighing less than 1500 grams;
- ◆ and neonates born before 28 weeks gestation.

The design of the audit form for the record review was based on the British perinatal audit

(Northern Regional Health Authority, 1992) and the confidential enquiry of maternal deaths in Ethiopia (Kwast et al., 1989). Management was designated as 'correct' or 'incorrect' according to the agreement between the protocols and actual management as indicated in the case notes. Investigators sought to determine "avoidable factors" in obstetric and pediatric management and availability of equipment and drugs. "Avoidable factors" were assigned according to a realistic assessment of what would be below acceptable standards of care or availability of equipment and drugs in the hospital. Avoidable factors were allocated to:

- ◆ patient/home circumstances;
- ◆ referral by TBA or others;
- ◆ service factors due to management by obstetric/pediatric/nursing staff
- ◆ lack of equipment, facilities and medications.

The analysis was done manually by a consultant obstetrician gynecologist for obstetric management and a neonatologist for pediatric management. No autopsies were performed.

Results

The hospital neonatal mortality rate (1-28 days) decreased from 38.3 in 1989, prior to hospital training, to 25.9 in 1991. There was a significant decrease in early neonatal mortality (1-7 days) from 32.9/1000 live births to 23.6/1000 live births. Separating early neonatal deaths into < 24 hours versus between 1 and 7 days showed a significant reduction in deaths days 1-7 (16.5 to 12.8). However, the reduction in deaths > 24 hours from 16.5 to 10.8 was striking but not statistically significant. In the year 1992, there was an increase in deaths by all age groups. While rates continued to be lower in 1992 than those in 1989, no significant changes were seen.

The major causes of all neonatal deaths were asphyxia, sepsis and hyaline membrane disease (usually associated with prematurity). Classified as "other" were various causes such as pulmonary hemorrhage, intracranial hemorrhage, and congenital abnormalities). (See Tables 2 and 3).

< 24 hrs

Table 2

NEONATAL MORTALITY FOR ASPHYXIA, SEPSIS, AND OTHER CAUSES FROM 1989 -1992*				
Year	Total Live Births	Asphyxia	Sepsis	Other Causes
1989	2796	35 ^a (12.5)	38 ^b (13.6)	34 ^c (12.2)
1990	3035	28 (9.2)	29 (9.6)	18 (5.9)
1991	3047	34 ^a (11.2)	27 ^b (8.9)	18 ^c (5.9)
1992	3348	31 (9.3)	31 (9.3)	36 (10.8)

a: difference between 1989 and 1991: $\chi^2 = 0.23$; $p = 0.634$

b: difference between 1989 and 1991: $\chi^2 = 2.90$; $p = 0.089$

c: difference between 1989 and 1991: $\chi^2 = 6.35$; $p = 0.012$

* neonatal mortality rate in parentheses

Table 3

EARLY NEONATAL DEATHS INVESTIGATED MEDICAL AUDIT BY CAUSE (1989, 1991, 1992)				
Cause of Death	1989	1991	1992	Total
Asphyxia	8	11	12	31
Sepsis	7	4	6	17
Hyaline Membrane Disease	13	10	8	31
Other	2	4	0	6
ALL CASES	30	29	26	85

Table 4

NEONATAL MORTALITY RATE FOR WEIGHT ALONE, ASPHYXIA AND SEPSIS BY WEIGHT FROM 1989 - 1992				
Variable	1989	1990	1992	Total
Weight Alone				
< 2500 Gr	25.7	18.5	19.0	22.0
> 2500 Gr.	12.6	5.93	5.9	12.24
Asphyxia /Weight				
< 2500 Gr.	8.5	5.27	4.59	8.06
> 2500 Gr.	3.25	2.63	2.95	2.96
Sepsis/Weight				
< 2500 Gr	7.8	7.3	6.8	6.2
> 2500 Gr.	5.7	2.3	1.9	2.9



Mortality by cause of death showed distinctions between birth weights. The neonatal mortality rate due to asphyxia decreased marginally while there was a greater reduction in death due to sepsis. When these changes are further analyzed by weight, the greatest reduction in neonatal mortality is among those babies weighing > 2500 grams from 12.6 in 1989 to 5.9 in 1991 (though there was some improvement in babies weighing less than 2500 g). The greatest decrease was in deaths due to sepsis among babies weighing > 2500g. (See Table 4).

The 85 deaths reviewed included 31 asphyxia deaths, 17 due to sepsis, and 31 to hyaline membrane disease, and 6 "others." (See Table 3). Age at death did not vary much between the three years. In a review of deaths on any day, 49 (57.6%) were preterm with a gestational age > 28-37 weeks. Among the preterm infants, 37/49 (75%) were <2500g. The predominant cause of death was from hyaline membrane disease (30/49), followed by sepsis (10) and asphyxia (9). Among the term babies, 75% weighed > 2500g and the majority died from asphyxia (22/36). Over half of the deaths in each year occurred within 24 hours of birth. Most of these are first day deaths which are due to asphyxia and hyaline membrane dis-

ease, whereas the majority of deaths from sepsis took place after 24 hours.

Further analysis was conducted on the data for the three major causes of death and "other" causes to investigate differences in prenatal care, complications of pregnancy and labor, mode of delivery, Apgar scores, management and avoidable factors.

The majority of women (approximately 65 - 80% for each cause of death) had received no prenatal care. On average, 70% of women who lost an infant had pregnancy complications, but only 42% of women who lost a baby to asphyxia. (This may be due in part to the fact that the majority of asphyxia deaths were term babies; thus, preterm labor was

not a possible pregnancy complication). It is difficult to draw connections between pregnancy complications and cause of death. However, there were more cases of preterm labor and preeclampsia among women who lost a baby due to hyaline membrane disease. Among the sepsis cases, there are more women with preterm prelabor rupture of membranes and among asphyxia cases there are more women with prolonged labor and breech presentation.

The average cesarian section rate was 39% for all causes of death. Approximately 12% of babies who died from asphyxia and sepsis had a vaginal breech birth. Babies who died from hyaline membrane disease and "other" causes had no breech births.

Approximately 51% of newborns had an Apgar score of 0-3 at birth. Of babies who died of asphyxia, 93.5% had an Apgar of 0-3. (The fact that most of these babies were born at term suggests intrapartum problems.) Furthermore, 51% of these babies still had an Apgar of 0-3 at 5 minutes. The recovery rate of babies with 0-3 Apgars who died from other causes was better; 80% had an Apgar of >4 at 5 minutes.

Ninety percent of babies that died from hyaline membrane disease were preterm with a weight

between 1500-2499g. This proportion was 38%, 52% and 17% for deaths from asphyxia, sepsis and other causes respectively.

Given that the majority of women had received no prenatal care, a reasonable assessment of management of pregnancy complications could not be made. Management of labor complications once the woman was at the hospital was found to be correct, according to the protocols for the most part, and this did not vary throughout the course of the study. Several women stated they were referred late by the TBA.

Resuscitation at birth was mostly correctly managed throughout the course of the study. Thermal control at birth could not be assessed. Subsequent management, ventilation and thermal control were mostly correctly managed. In 1989, there was a serious shortage of oxygen and for that reason medication is categorized as incorrect. However, despite the shortage of oxygen, ventilation was not labeled as incorrectly managed. An improvement in infection control was seen between 1989 and 1991. Breastfeeding could not be assessed because there was no information on this parameter.

Avoidable factors were assigned for substandard care allowing for what could be reasonably expected. During all three years (1989, 1991, 1992), the patient was assigned the majority of prenatal avoidable factors because a factor was assigned for no prenatal care or for delay in labor at home before coming to the hospital. The TBA or other health personnel could be assigned an avoidable factor if there was a delay in referral, mostly during labor. Obstetricians and pediatricians (private practice or hospital) were assigned an avoidable factor if diagnosis was delayed or management was incorrect. Shortage of antibiotics or oxygen earned an avoidable factor under "drugs." Lack of ventilators or nonavailability of the operating room earned avoidable factors assigned under "equipment."

A percentage of avoidable factors was calculated from total possible scores. The total possible score for each period of activity was multiplied by the total number of patients in that year and divided by the actual score. The total number of avoidable factors possible per patient for the prenatal period was 6; for labor and delivery, 6; for the newborn 8. The percent avoidable fac-

Table 5

PERCENTAGE OF AVOIDABLE FACTORS BY PREGNANCY AND NEONATAL PERIOD 1989, 1991, 1992 (N = 85)									
Year/ Avoidable Factors	Prenatal ¹			Labor ²			Neonate ³		
	Total	Actual	Percent	Total	Actual	Percent	Total	Actual	Percent
1989 (n = 30) Avoidable Factors	180	26	14.4	180	22	12.2	240	37	15.4
1991 (n = 29) Avoidable Factors	174	25	14.4	174	28	16.1	2284	22	9.6
1992 (n = 26) Avoidable Factors	156	23	14.7	156	23	14.7	2005	79	39.5

¹ Total possible avoidable prenatal factors per woman = 6

² Total possible avoidable labor factors per woman = 6

³ Total possible avoidable neonatal factors per woman = 8 (4 for management at birth; 4 for subsequent management)

⁴ Total score does not add to 232 because 4 points are subtracted for 1 neonate who died before subsequent management

⁵ Total score does not add to 208 because 8 points are subtracted for 2 neonates who died before subsequent management

tors for the prenatal period remained constant for three years at 14%. The percentage for labor and delivery fluctuated between 12% and 16%. There was a substantial drop in avoidable factors for the neonate, from 15.4% to 9.4% between 1989 and 1991. This percent rose dramatically to 39.5% in 1992 primarily due to a shortage of oxygen. (See Table 5).

Conclusions

The reduction of neonatal mortality from 38.3 in 1989 to 25.9 in 1991 indicates that the reorganization of neonatal services with the arrival of a neonatologist and the revision of standards of obstetric and neonatal care have had an effect. Note that the year 1992 saw an increase in deaths primarily associated with the lack of oxygen supply. The greatest impact seen was on neonatal mortality after 24 hours for term babies, and this was associated with improved management of sepsis.

The audit showed that over 50% of deaths took place within the first 24 hours of life from 1989-1992 and were mainly due to asphyxia and hyaline membrane disease, which is associated with prematurity. These results are in accord with an earlier study in a Guatemalan community (Bartlett et al., 1991).

In spite of intensive training in resuscitation, the low Apgar scores at birth (0-3) of those babies

who died from asphyxia hardly improved at 5 minutes. Of special concern is that the majority of these babies were at term. This highlights the need for improvement of labor management both at the community and at hospital levels. Even though the TBA has been targeted for intensive training on recognition of complications, an effort should be made to educate women and their families as well to recognize, in particular, prolonged labor early on and to go to the hospital quickly. Hospital obstetric management cannot have much of an impact on intrapartum asphyxia which exists prior to admission. Almost 50% of women needed a cesarean section, the majority as a result of prolonged labor and fetal distress.

Many women had prenatal complications which were not identified because these women had not had prenatal care. Three or four prenatal contacts during a pregnancy would provide an opportunity for women to hear about and learn to recognize danger signs for which help should be sought in a more timely manner.

Finally, an ongoing medical audit, conducted in a supportive and cooperative atmosphere, can be an effective tool for improving obstetric and neonatal management. However, inclusion of a case fatality rate in assessments of quality of care and the measurement of changes over time is recommended to give a better understanding of the dynamics in the hospital setting.

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SECTION TWO

COMMUNITY INVOLVEMENT

Analysis of the Vital Events Reporting System of the Maternal and Neonatal Health Project, Quetzaltenango, Guatemala

P.E. Bailey, DrPh, J.A. Szaszdi, MD, and B. Schieber, MD. December 1994. MotherCare Technical Working Paper #3.

The Quetzaltenango Maternal and Neonatal Health Project trained traditional birth attendant (TBA) trainers in order to improve their technical knowledge and to develop their training skills. The actual training of over 400 TBAs, conducted between March and May 1992 in three-day sessions, focused on the detection and timely, adequate management of obstetric and neonatal complications. Emphasis was placed upon the detection, management and timely referral of the complicated obstetric and neonatal cases that presented the greatest risk of mortality. Harmful practices such as the abuse of oxytocin injections and the use of alcoholic beverages during labor were also discouraged.

As stated in the previous abstracts, the project also developed norms and protocols for the management of maternal and neonatal complications at the health center and at the hospital. Medical and paramedical staff at the hospital were trained in the application of the protocols. The standardization of care of complications was given a high priority and to that end an effort was made to strengthen a referral system encompassing TBAs in the community, personnel at the district level health facilities and medical personnel at the hospital. Included in the intervention was an effort to foster good working relationships between the different levels of

health care providers and the humane treatment of both women and TBAs. Meetings were held at all levels to sensitize providers to the need to respect the TBAs and the important part they play in the referral system. Posters placed in all health facilities reminded providers that everyone in the community is trying to save the lives of women and newborns.

Study Design

To evaluate the impact of the TBA training, The Vital Events Reporting System (VERS) was designed. The VERS utilized stratification and cluster sampling in both an intervention and a control area. Strata were selected based on distance from the closest hospital, the *Hospital General de Occidente San Juan de Dios* described in the previous two abstracts in this issue, and size of population. The final inter-

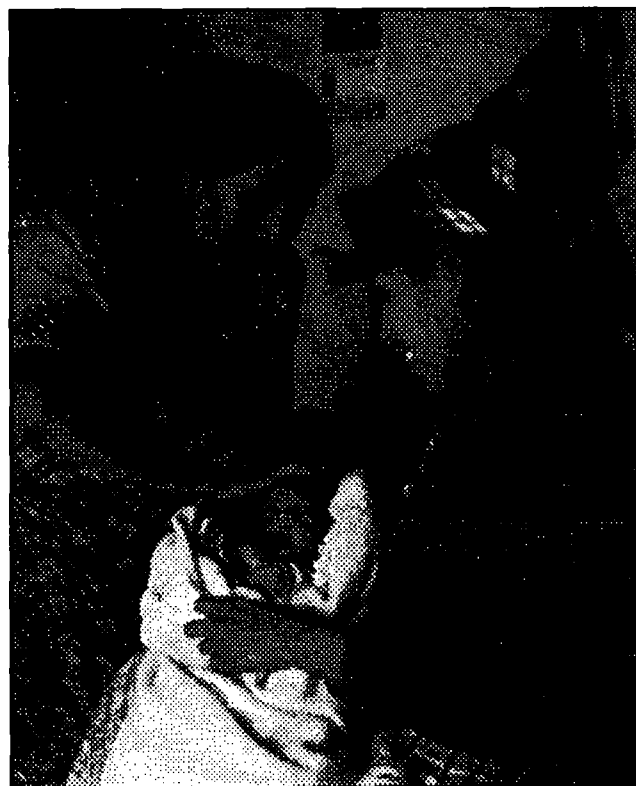
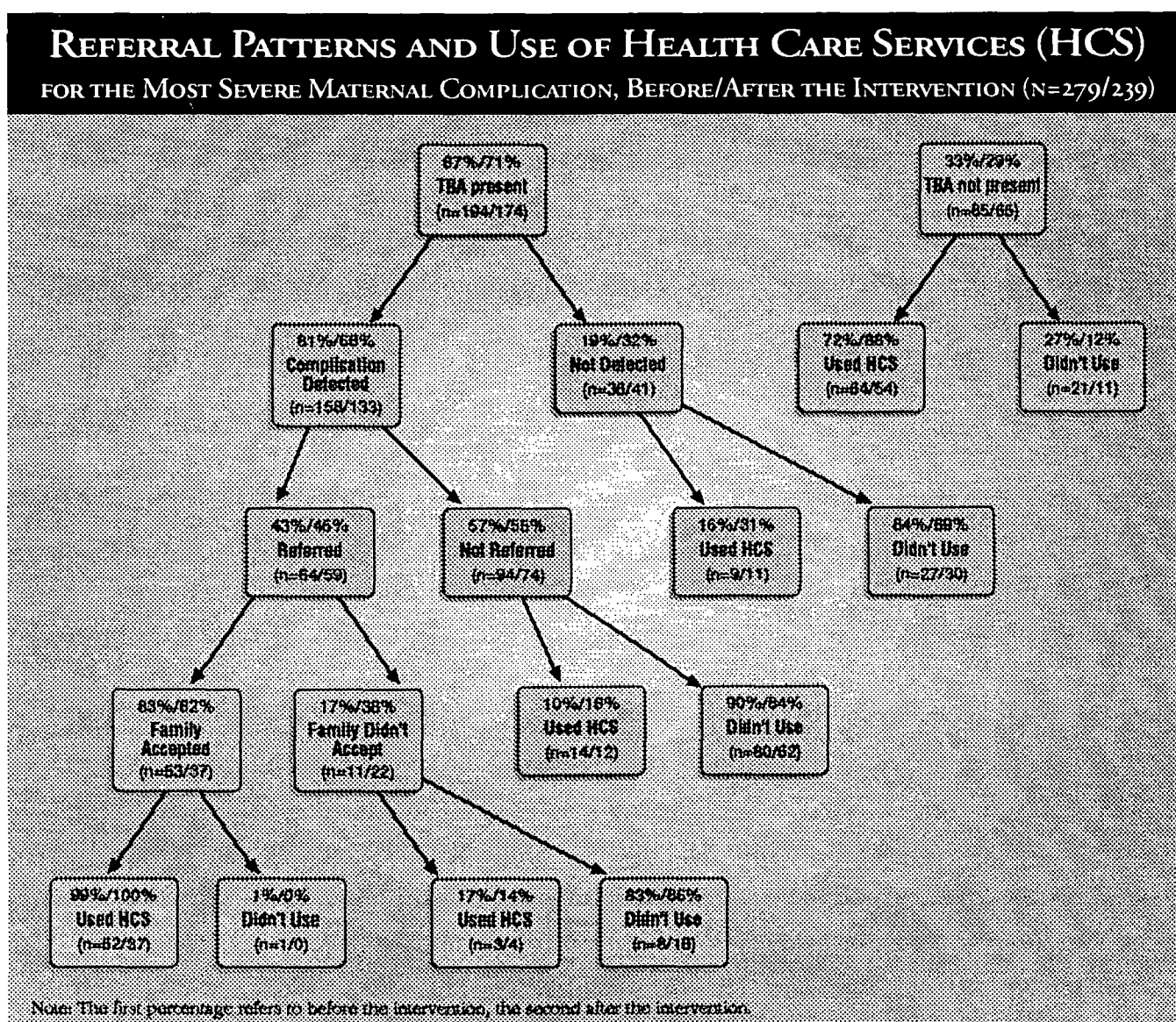


Figure 2



vention area consisted of 10 municipalities of the department of Quetzaltenango; the control area consisted of five municipalities of Quetzaltenango and four in the department of San Marcos. Total population of both the intervention and control areas was 165,000.

Data Collection

Data collection was based on a census of all births (n=4031) including both members of twin sets that occurred in the treatment and control areas during a period of almost three

years (July 1990 through May 1993). Interviews were conducted by physicians with 1791 mothers: 836 who reported a complication associated with pregnancy, delivery, the postpartum period or her newborn and 955 mothers of normal births (approximately 35% of all normal births). The additional 2,240 normal births were added to the database in order to calculate the complication incidence rates. Information was gathered on a three-page questionnaire. Data were collected from sample mothers for each birth that occurred during four time periods.

Analysis

For this analysis, women are the focus, specifically women with complications and how they were managed. Questions asked included whether the TBA was present at the time of the complication, and if so, did she refer the woman? Was the referral accepted, and did she use health services? (See Figure 2 for pre-post results). Note that there was no significant difference in the results between the intervention and control areas in terms of management of complications. Hence, the analysis lumped the areas and focused on pre- and post-intervention results.

To study the management of complications, the most life-threatening problems reported by the woman for each phase (pregnancy, labor and delivery, and the post-partum phase) was followed. Given that women may have reported more than one complication, a hierarchy of complications was created. Because a woman may have reported several problems during a phase, a "double" hierarchy was created: a composite of antenatal, intrapartum and postpartum problems, where, for example, if a woman reported a complication in both delivery and postpartum period, the more life-threatening complication and its management is examined. (See Box 1 for the hierarchy of complications.)

Results

Incidence of Complications

Impact of the training of TBAs was examined according to pre/post intervention time periods and by intervention/control area. Complication rate data were collected from 3,518 women and include 695 women with complications and 2,823 women with normal single pregnancies and births; women with twins (45), or women who delivered during implementation of the TBA training were excluded from the analysis. Overall, 20% of women reported one or more complications during pregnancy, labor/delivery or in the postpartum period. According to mothers' reports, almost one in 10 fetuses and newborns suffered from low birth weight/prematurity, asphyxia, neonatal sepsis, respiratory

Figure 3

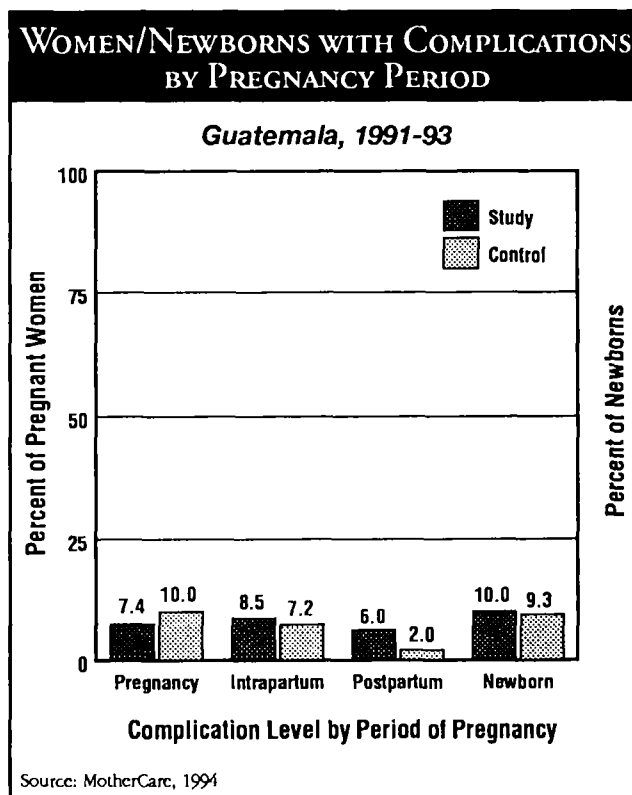


Table 6

DECISION-MAKING TO USE HEALTH CARE SERVICES FOR MOST SEVERE MATERNAL COMPLICATIONS—QUETZALTENANGO		
	Use of Services by Women with Complications (%)*	
	Before (n=279)	After (n=239)
TBA Referred/Complied	19.2	13.3
TBA Contact Only	12.6	21.6
TBA Not Involved	23.6	25.8
Women Using Services	49	52

*Based on weighted numbers

Source: MotherCare, 1994

HIERARCHY OF COMPLICATIONS—QUETZALTENANGO PROJECT

I. Antenatal complications. If a woman had only one antenatal condition, there was no difficulty in coding her complication. However, there were 29 women with more than one antenatal complication. If a woman, for example, had a hemorrhage and edema, the hemorrhage and its management took precedence over the edema.

1. hemorrhage
2. edema and hypertension = pre-eclamptic toxemia (PET)
3. edema and anything else — > edema
4. previous C-section
5. premature contractions

Malpresentation never took precedence over another complication.

II. Intrapartum complications. There were 49 women with more than one intrapartum complication.

1. transverse lie (member prolapse was always found with transverse lie)
2. prolonged labor (maternal exhaustion was always found with prolonged labor except once)
3. hemorrhage
4. premature rupture of membranes (PROM) (+ premature labor)
5. premature labor (+ breech)
6. previous C-section (+ breech)

Member prolapse, maternal exhaustion, fever, breech, or convulsions never took precedence over another complication.

III. Postpartum complications. There were 25 women with more than one postpartum complication.

1. convulsions (was never accompanied by retained placenta)
2. retained placenta
3. hemorrhage
4. fever
5. sepsis

Endometritis never took precedence over other complications.

IV. Baby complications. There were 72 newborns/fetuses with multiple complications.

1. absence of fetal movements
2. asphyxia
3. respiratory infection
4. sepsis

Low birth weight/prematurity never took precedence over other complications. Tetanus was never coded with another complication.

V. "Double" hierarchy for maternal complications. When looking at maternal complications, a woman could have had an antenatal problem, an intrapartum problem and/or a postpartum problem. There were 173 women who had complications at more than one time period. Babies were always analyzed separately.

In general, intrapartum complications took precedence over postpartum complications, which took precedence over antenatal problems.

1. delivery complication
2. postpartum complication
3. antepartum complication

The exceptions:

- Retained placenta took precedence over PROM, breech presentation and prolonged labor.
- Postpartum convulsions over postpartum hemorrhage, PROM and prolonged labor.
- Antepartum hemorrhage took precedence over PROM and premature labor.
- Prolonged labor took precedence over retained placenta.
- Endometritis took precedence over PROM.
- Edema took precedence over premature labor.
- Postpartum hemorrhage took precedence over previous C-section.

infections, tetanus or absence of fetal movements.

About 9% of women had complications during pregnancy, 8% during delivery and 4% during the postpartum period. There were no differences found in complication rates by intervention or control group. (See Figure 3). Only among postpartum complications was there a significant decrease from 6% to 2% between pre- and post-intervention periods.

Management of Complications (See Figure 2)

Overall, about half of the women with complications (see Table 6) used health care services. This proportion did not change over the time of the project even with the interventions. Of those women who used services, about 55% had experienced some contact with a TBA, but those actually referred by TBAs decreased (from 19% to 13% pre- to post-intervention) of all women with complications.

Among the 518 women reporting a serious maternal complication included in the study, a third reported that TBAs were not present at the time the complication was experienced; after the intervention, 29% said they were not present when a complication was experienced. And, among the women *not* seen by a TBA at the time of the complication, use of health services actually increased (72% vs 88%).

Among women who reported having a TBA present at the time of the complication, detection of complications by TBAs actually decreased post-intervention, according to women (81% vs 68%). But if their complication was detected by a TBA, less than half of these women were referred; this did not change pre- to post-intervention. Of those women referred by TBAs, four out of five complied with the referral initially, but this proportion decreased over time (83% vs 62%).

Intrapartum complications result in death more often than complications experienced during pregnancy or in the postpartum period. Hence, focusing on that period (n=135 women with complications pre-intervention and 143 post-intervention) the general pattern is repeated! Nearly a third of women did not have a TBA present. Of these, four of five used health facilities. When a TBA was present, detection of the

intrapartum complication followed the general pattern - a decrease in detection of the complication as reported by women (68% vs 54%), with less than half of those detected being referred (44% vs 44%). Compliance with TBA referral significantly declined in the post-intervention period to less than half.

Yet during the postpartum period, detection of complications by TBAs increased (78% vs 85%), referral increased (32% vs 46%), but compliance with referral decreased (95% vs 54%). However, the numbers are quite small.

Detection of newborn complications decreased after the intervention (80% vs 65%) and referral decreased (14% vs 5%). The likelihood that a TBA was present at the time of a fetal/newborn complication more than doubled after the intervention. Compared to women attended by a TBA, when no TBA was present women were 40 times more likely to use health care facilities!

The following are three basic questions which were asked to further assess the care that women with complications received:

1. What were the complications among women who never used health services? Were they different from those who received services?

	<i>Got services</i>	<i>No services</i>
Pregnancy	premature contractions	malpresentation
Delivery	transverse position	breech presentation
Newborn	sepsis respiratory infection	low birth weight asphyxia

2. Which complications were commonly detected and not detected?

	<i>Detected</i>	<i>Not detected</i>
Pregnancy	premature contractions	
Delivery	breech presentation	premature labor prolonged labor
Postpartum	retained placenta	
Newborn	asphyxia	low birth weight

3. Which complications were most frequently referred and not referred?

	<i>Referred</i>	<i>Not referred</i>
Pregnancy	hemorrhage malpresentation premature contractions	
Delivery	prolonged labor	
Newborn		asphyxia

Discussion

The probability that a maternal complication was attended to at a health care facility increased dramatically — 6 fold — when a TBA was *not* present compared with women with complications attended by a TBA. This suggests that either some women with complications go directly to health services and bypass TBAs, or that women do not have access to TBAs but do have access to health care facilities. Furthermore, the likelihood that a TBA detected the complication decreased by half after the intervention compared with before.

Thus, the intervention period appears to be significantly associated with a decrease in the detection of complications by TBAs and not associated with either an increase in referrals or the use of health care services by these women. However, when no TBA was present, there was an increase in service utilization (the proportion of women with postpartum complications using services almost doubled, 58% vs 96%) suggesting that women and their families on their own know to seek institutional care.

Conclusions

The analysis of the community-based (VERS) data shows little measurable impact of the TBA training intervention on complication rates and

management of complications (with the possible exception of postpartum complications). The time span under scrutiny—one year post-intervention—may have been too short to detect behavioral changes. The size and scope of the study design and the use of retrospective reporting by women of events (up to six months) may have permitted reporting bias or inconsistencies in the definition of “referral.”

A lack of differences between the intervention and the control areas may be due to the hospital staff training intervention which may have “contaminated” the control area. Improved interaction between personnel and TBAs and women may have encouraged all TBAs and women to access institutional services to a greater extent from anywhere in the area.

Only in the sphere of postpartum complications does there seem to be any sign of improvement. The incidence of postpartum hemorrhage, fever, and convulsions decreased significantly. Since the complications were reported by the woman and filtered through a physician interview, the decreases are not likely to be an effect of definition refinement by the TBA. Furthermore, detection and referral of postpartum complications increased among women who saw a TBA. The patterns are distinctly different from those of antenatal, intrapartum and newborn complications.

TBAs do not refer complications as often as they should, such as malpresentations, even when they are detected. The barriers to referrals, however, are complicated and appear to transcend the scope of the TBA training conducted. Is it that in this particular area where 40% of women live within one hour travel time of the hospital, that use of health services for complications is relatively normal from a family stand-point, whereas TBAs are expected to deliver women who have non-complicated births?

Commentary

1. Do improvements in the quality of care at the referral facility improve outcomes of pregnancy?

The improvements in the referral hospital for the intervention area, *Hospital General de Occidente San Juan de Dios*, included:

- ◆ development of protocols for the management of obstetrical and newborn complications;
- ◆ staff orientation to these protocols in 2 day sessions;
- ◆ sensitization of staff to the culture of the women, families and the traditional birth attendants (TBAs) in the area;
- ◆ posters to remind staff that TBAs/families are also trying to save the lives of women and newborns;
- ◆ a retrospective perinatal/neonatal death audit; and
- ◆ some improvements in sanitation and organizations of service.

A neonatology specialist joined the hospital staff in 1990 and led the improvements in the neonatal wards and in management of newborns. Unfortunately, at the same time, the obstetricians were often out of work because of lack of payment. Continuous supplies and equipment to support the tasks as stated in the protocols could not be ensured; hence, some very important components did not always run as planned (note specifically the lack of oxygen in 1992 and its impact on newborn mortality). Service improvements did not include competency-based training using the protocols as the foundation for the curriculum and training materials; the "hospital training" was actually an orientation to the protocols given in didactic fashion. And while it was planned that the perinatal/neonatal death audit would take place every month, it was carried out retrospectively due to lack of time by hospital physicians.

The hospital perinatal mortality rate did decline after the improvements at the hospital, and while this is in the desired direction, the change was not significant. There were very few/no maternal deaths over this same period among referred women but given the disruption in the obstetrical department caused by salary slowdown, management of women could not be followed through a death audit or record review of complicated cases versus the protocols. Instead, improvements in the obstetrical side are implied by the perinatal outcomes.

From the perinatal death audit, it appears that the greatest result of the interventions was to decrease the deaths of newborns suffering with sepsis and among those who were of birth weight ≥ 2500 grams. Asphyxia contributed a greater proportion of the deaths of newborns as sepsis declined, and even intensive training on resuscitation did not change the direction of this problem. Perhaps efforts to convince families to bring women into the hospital before labor is termed "prolonged" would have an impact on this problem. According to interviews with women, prolonged labor is not detected by TBAs, although neonatal asphyxia is; unfortunately, women reported they were not referred nor did they generally use services for this problem.

Did development and orientation to protocols for managing obstetrical and newborn complications make a difference in terms of the deaths due to sepsis? It is not possible to determine what the crucial factor was, as the impact of protocols is confounded by a neonatologist joining the hospital staff at the same time. The neonatologist assisted with the development of the protocols and proceeded to ^{not} implement them. (A perinatal death audit was a factor in this improvement although audits have been found to impact on quality of care in other studies (Bhatt, R.V. 1989; Bugalho and Berstrom 1993). Unfortunately, the audit was only implemented retrospectively in Quetzaltenango.) A recent review of the impact of clinical guidelines on provider prac-

tice and patient outcomes found that protocol development and implementation has been successful in making significant changes in the process of care in the direction proposed by the guidelines in all but 4 of 59 studies reviewed. Looking at patient outcomes, all but 2 of 11 studies found some significant improvement (Grimshaw and Russell, 1993). This review focused only on investigations of clinical guidelines designed for medical staff that evaluated the introduction of guidelines in terms of the process of medical care or the outcome for patients. It also collected enough data for meaningful statistical analysis and, most importantly, had a rigorous study design.

While it remains impossible to distinguish which factor caused improvement in the technical quality of care for neonatal sepsis and whether this could have been increased or strengthened for other causes of perinatal mortality beyond sepsis as well as for maternal health, we do know that referrals increased to the hospital, both from the intervention as well as from non-intervention areas. This increase in referrals was seen from hospital records; numbers were too small to be picked up from community surveillance. Hence, something about the hospital itself generated demand. Given that the "hospital training" seems to be the only change that was detected prior to the increase in recorded referrals, it is anticipated that the intervention of importance is the sensitization of the hospital staff to the culture of birthing in the community it served, including opening its doors to welcome in the family and TBA of the woman. Waiting time decreased for those complications that require immediate attention e.g., postpartum hemorrhage—one of the concerns women had spoken about as a barrier to using formal health facilities for their care. Improving the "quality of care" was perceived by women to be important, such as allowing family, friends and community providers, e.g., the trusted TBA, to accompany one to the hospital. This is likely to have encouraged TBAs to increase their referrals to the hospital.

2. Does TBA training help to increase detection and referral of women and newborns with complications to the improved facility?

What appears to be at odds with the conclusions from the hospital study are the results from the community surveillance. First, according to women's answers to the community-based survey, referrals by TBAs did *not* increase over the course of the project; rather, proportionately more women and families with complications went on their own to the hospital in the post-intervention year. This seeming conflict could not be validated by comparison of data from the community surveillance and hospital records as these data sets were not linked. Secondly, the hospital study only focused on women who stated they had been referred by TBAs, and not on all women who delivered at the hospital with or without complications and who may have self-referred or been brought directly by their families. Given that the numbers are small, it is anticipated that the results of hospital records showing increased referrals is diluted when one looks at the community data.

What is important to recognize in this project is that nearly half of the women with complications used health services even before the interventions took place, and this percentage did not significantly increase after the interventions (49 vs. 52%). Approximately a fifth of women with complications who used health facilities did so at the referral by TBAs prior to the interventions. Afterwards, this proportion decreased to 13%. More women were going to services after the interventions either directly or in spite of the TBA who didn't recognize the complication (recognition declined from 81% pre-interventions to 68% post-interventions). In some cases, the TBA did not refer the woman, or the woman stated she did not accept the referral but went to a health facility anyway.

The weight families place on services and on TBAs becomes more apparent when one looks at the timing of TBA involvement. More than four out of five women saw a TBA for

prenatal care, regardless of whether the woman experienced a complication. Two thirds of women with antepartum complications who used services had seen a TBA; the other third went directly to services. Intrapartum and postpartum complications seemed to signal more danger to families, and 52% and 65% of women with such complications respectively who used services did so directly; no TBA was involved. Fetal or newborn complications seemed to be given the most weight in families with nearly 91% going directly to services among the over 53% women with such births who ultimately did use services for these complications.

The effect of the Quetzaltenango community-based interventions appears negligible, according to women surveyed, not because the TBAs' role in referral is negligible, but because they appeared to be already referring a significant proportion of complicated cases before the interventions. More significantly, women were already seeking out health facility use even without a TBA. These data suggest an independence on the part of the woman and her family in seeking out services when they determine there is a complication. Some women go directly to health services, bypassing the TBA; another explanation could be that women don't have access to TBAs but have access to health facilities. They may have been planning to use health services already and did so when they recognized a complication.

Women in this study area are not that distant from the referral hospital; approximately 42% are within 60 minutes of the hospital. Roads are relatively good and transport is available. Use of services for women with maternal complications appears to be fairly normal behavior, although uncomplicated births at home with a TBA is the common procedure in Quetzaltenango. Improving the recognition and timely referral of complicated cases by TBAs did not appear to make a major difference in the community most likely because of this already existing pattern of use of services for complications.

Three important lessons are learned from the Quetzaltenango Maternal and Neonatal Health Project:

1. Lesson learned for Step 4 of the Pathway to Survival on Quality of Care:

A positive image of the referral hospital has proven effective in increasing use of services. As no advertisement was made of the changes at the hospital, the news must have passed rapidly by word of mouth. A "woman - friendly" hospital appears to generate its own demand, at least in the immediate area; Quetzaltenango is an area where 42% of women live within one hour of the hospital and transport is relatively easy to find. The reverse of this was confirmed in the Danfa project in Ghana: women preferred TBAs in that setting because of their fear of anticipated treatment, described as painful and disrespectful, in the hands of medically trained staff (Eades et al., 1993).

2. Lesson learned for Step 1, 2 and 3 of the Pathway to Survival addressing access issues:

Little is known about decision-making in families with regard to seeking care for complicated obstetrical or neonatal problems. However, it appears that it is the family that will take the decision. They may be influenced by TBAs, but as seen in this periurban project and in the rural areas of Forteleza, Brazil, where a project to connect TBAs and their clients with hospital back-up had been on-going over a 10 year period, the TBA was by-passed when a complication occurred more often than not (Bailey et al., 1991; Janowitz et al., 1988). Hence, the importance of focusing on the family not only for recognition of complications, but also because they are the primary decision-makers for determining whether and where women will seek care, is now obvious.

3. Lesson learned on measurement issues:

Whether women with complications deliver in the referral facility is most easily (and with less

cost) determined through an examination of well-kept facility records rather than through community surveys in which numbers are small. In addition, if one is asking the more specific question of whether the woman with

complications delivering at a facility was referred by a TBA (or other provider), there is even more reason to focus on hospital records and ensure their quality.

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MotherCare regrets an oversight in a past issue of **MotherCare Matters**. Credit is given to Joan Sullivan for her photograph of a woman and child in Malawi which can be found in Volume 4, No. 2; *"Healthy Pregnancy, Safe Delivery—The MotherCare Experience"* on page 11. We sincerely apologize for the omission, and we would like to take this moment to thank Joan for her artistic contribution to our newsletter.



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