

Table 3. Staffing Patterns of Medical Facilities Where Maternal Deaths Occurred by History of Transfer, Japan, 1991-1992*

Staffing Pattern	Mean No. (SD)		
	Nontransferring (n = 82)	Transferring (n = 115)	Receiving (n = 115)
Obstetrician/gynecologist on duty†			
Total staff	3.3 (2.6)	1.6 (1.3)	8.4 (7.5)
Evenings and weekend daytime	0.5 (0.6)	0.4 (0.5)	1.1 (0.9)
Anesthesiologists on duty†			
Total staff	0.6 (1.7)	0.1 (0.3)	4.3 (6.7)
Evenings and weekend daytime	0.1 (0.3)	0.0 (0.2)	0.7 (0.9)
Operating room nurses on duty			
Evenings and weekend daytime	0.5 (0.9)	0.2 (0.8)	1.2 (1.3)
Neonatologists on duty†			
Evenings and weekend daytime	0.1 (0.3)	0.0 (0.2)	0.5 (0.7)

*Nontransferring indicates medical facilities where patients were never transferred; transferring, medical facilities that transferred patients to receiving facilities; and receiving, medical facilities where the patients ultimately died after transfer from a transferring facility.

†Numbers include residents and house officers.

Table 4. Obstetrical Characteristics of Maternal Deaths, Japan, 1991-1992 (n = 197)*

Characteristic	No. (%)
Prenatal care	
Regular	158 (80)
Some	8 (4)
None	21 (11)
Unknown	10 (5)
Gravidity	
Primiparous	73 (37)
Multiparous	114 (58)
Unknown	10 (5)
Mode of delivery	
Cesarean	73 (37)
Emergent	63
Elective	10
Vaginal	72 (37)
Unassisted in medical facility	44
Vacuum assisted	17
Home birth	5
Breech extraction	3
Forceps assisted	3
Died prior to delivery	52 (26)

*Only deaths that occurred in medical facilities are included. Eleven deaths were not included in the analysis because 3 facilities refused participation, 5 had no patient records, and 3 were closed.

(0.8) in university hospitals and 0.7 (0.6) in nonuniversity hospitals. In the latter group, 42% (31/74) did not have an on-duty obstetrician in the hospital at night and during weekends or holidays. Among nonuniversity facilities, only 95 (84.1%) could perform blood cell counts and only 39 (34.5%) could perform coagulation studies during these times. Staffing levels and availability of laboratory and diagnostic testing were progressively lower in the nontransferring and transferring facilities.

Examination of Maternal Deaths and Their Causes

The obstetrical characteristics of the 197 in-hospital maternal deaths are depicted in TABLE 4. Most women (80%) received regular prenatal care. Primiparous women accounted for 37% of cases, and 58% of women were multiparous. Twenty women of the latter group had a history of 1 or more cesarean deliveries. Of the 197 pregnancies, 73 (37%) were cesarean deliveries, of which 63 were conducted emergently, and 10 were elective. Of the 72 vaginal deliveries (37%), most (44) were normal spontaneous deliveries occurring in a medical facility, although there were also 5 births outside a medical facility. Seventeen deliveries required vacuum assistance, and there were 3 forceps deliveries and 3 breech extractions. Fifty-two women (26%) died prior to delivery. Eighteen women (9%) had a total abdominal hysterectomy, and 10 women (5%) had a subtotal hysterectomy to control brisk bleeding. Autopsy was performed in 44 cases (22%).

Causes of maternal deaths in the participating facilities are shown in Table 5; the most common causes of death were antepartum and postpartum hemorrhage. Coroner examination was performed for the 22 cases that were not under the care of a physician at the time of death (TABLE 5). These causes were similar except for the proportionately

large number of deaths, 4 (18%), attributed to acute heart failure.

Assessment of Preventability

Seventy-two cases (37%) met the 2 criteria for being preventable. First, in all of these cases, none of the committee members selected *impossible to prevent*. Second, in 19 cases, all the members selected *not difficult to prevent*, and in the other 53 cases, 70% or more of the committee members selected *not difficult to prevent*. Of these 72 cases, there were 46 deaths due to antepartum and postpartum hemorrhage, 10 deaths secondary to hypertensive disorders of pregnancy, 4 deaths associated with anesthesia, 3 deaths each due to multiple organ failure associated with coagulopathy and hyperemesis gravidarum, 1 death each due to intracerebral hemorrhage, pulmonary embolism, sepsis, and an indirect cause. Two deaths were unexplained.

Of preventable deaths, 49 (68%) were attributable to the physician attempting to act as both the obstetrician and anesthesiologist: 46 cases of antepartum and postpartum hemorrhage and 3 cases of anesthesia complications. Of the 72 preventable deaths, there were 45 cases (63%) with deficiencies in hospital care; 9 cases (13%) with deficiencies in ambulatory and inpatient care; 7 cases (10%) with deficiencies in ambulatory care; and 11 cases (15%) for which consensus was unobtainable. The committee judged there was failure to meet a basic community practice standard in 36 cases (50%).

An additional 32 deaths (16%) were deemed possibly preventable. In 28 cases, no committee member picked *impossible to prevent* and in 4 cases, 70% or more of the committee members selected *not difficult to prevent*, but 1 committee member selected *impossible to prevent*. Of these deaths, only 11 (34%) were associated with hemorrhage and 7 (21.8%) with indirect cause, 5 (15.6%) with unexplained causes, and 9 (28%) with distribution similar to that of preventable causes.

Among unpreventable deaths that occurred in a medical facility with an ob-