

ciated with maternal mortality in Japan. Japan's obstetricians are distributed among a large number of small hospitals that typically only have basic laboratory services and often only on a limited basis. Approximately 40% of Japan's annual deliveries occur in clinics with 19 or fewer beds. Frequently, 1 physician takes care of all outpatients and inpatients, including deliveries (range, 100-1000 inpatient deliveries per year), 24 hours per day, 365 days per year. About 30% of annual deliveries occur in such small hospitals (mean [SD] number of general beds, 106 [215]), staffed by 1 or 2 physicians, where laboratory services are only available during the day on weekdays. The remaining 30% of annual deliveries occur in large hospitals (mean [SD] number of general beds, 577 [295]). Many of the obstetrics and gynecology departments in these hospitals have only 3 to 8 physicians (mean, 4), although in university hospitals the range is 10 to 20. In turn, these physicians take care of all the outpatients, inpatients, and deliveries (usually 300-1500 deliveries per year) all day and all night throughout the year. Only a small percentage of hospitals have 24-hour laboratory services and anesthesiology staffing.

Japan lacks a system to provide regional, round-the-clock, advanced care inpatient obstetrics coverage, and this deficiency may be contributing to the maternal mortality rate. Among women receiving medical care, facilities with only 1 obstetrician had the highest rates of preventable deaths from all causes and the highest rate for hem-

orrhagic deaths. Moreover, these criteria likely underestimate the magnitude of the problem. First, by very conservative preventability criteria, 72 women died from preventable medical errors—an additional 32 deaths were possibly preventable. Second, death certificate data underestimate maternal deaths because there is no requirement to note recent or current pregnancy. Third, the proportion of indirect deaths in our study is lower than other countries,^{19,20} a fact strongly suggesting that some maternal deaths occurring during the study period were never identified. Finally, these problems in underreporting may be exacerbated by legal concerns, although the magnitude of this effect is probably less important in Japan, which has a less litigious climate than the United States.

Maternal deaths secondary to hemorrhage are the most important cause of preventable deaths. Almost all of these could likely have been prevented if the patients had been treated by more than 1 obstetrician or by an obstetrician with assistance of at least 1 other clinician to manage the nonobstetrical aspects of the patient's care. Had these 40 hemorrhagic deaths alone been prevented, there would have been an estimated reduction in the 2-year overall maternal mortality rate of 17% (9.5/100 000 to 7.8/100 000) and in the preventable mortality rate of 56% (3.0/100 000 to 1.3/100 000).

Maternal mortality has decreased slightly since the time of the incident deaths in 1991-1992, for example, the rate in 1990 was 8.6/100 000 (105/

1 221 585) and in 1995 was 7.2/100 000 (85/1 187 064), although the rate of potentially preventable causes has not changed. The maternal mortality rates attributable to hemorrhage and toxemia in 1990 and 1995 were 4.0/100 000 (49/1 221 585) and 3.9/100 000 (46/1 187 064), respectively. The decrease occurred primarily in the category of deaths attributable to ectopic pregnancy. The total maternal deaths in 1990 and 1995 were, respectively, 10 and 2 deaths secondary to ectopic pregnancy, 49 and 46 deaths secondary to hemorrhage or toxemia, 29 and 19 other direct obstetric deaths, and 14 and 18 indirect obstetric deaths. The increasing availability and diffusion over the past 8 years of highly sensitive home pregnancy kits and the standard obstetrics practice of performing ultrasound examination on virtually all pregnant patients is believed to have facilitated earlier detection and treatment of ectopic pregnancies and thus reduced the incident deaths. However, the system of obstetric care has not changed.

Based on above analysis, we believe that the current Japanese maternal death rate attributable to hemorrhage continues to be the most important cause of preventable maternal mortality in Japan and that reforming the medical delivery system could result in a tangible reduction in maternal mortality. Reducing single obstetrician only delivery patterns, providing full laboratory services in all hospitals delivering babies, and establishing regional 24-hour inpatient obstetrics facilities for high-risk cases are the most promis-

Table 8. Obstetrics and Anesthesiologist Staffing in Medical Facilities Rendering Treatment During Critical Period of Maternal Death Preventability, Japan, 1991-1992*

Maternal Deaths	Staffing							Total No.
	Obstetricians, No.				Anesthesiologists, No.			
	0	1	2-3	≥4	0	1	≥2	
Total in-hospital	8†	90	51	48	184	7	6	197
Unpreventable	6 (75)	47 (52)	34 (67)	38 (79)	115 (63)	5 (71)	5 (83)	125
Preventable from all causes‡	2 (25)	43 (48)	17 (33)	10 (21)	69 (38)	2 (29)	1 (17)	72
Preventable from hemorrhage	1 (13)	40 (44)	5 (10)	0 (0)	43 (23)	2 (29)	1 (17)	46

*Data are given as No. (%) unless otherwise indicated. For all categories of maternal deaths, percentages are percentage of total deaths in staffing category. Eleven deaths were not included in the analysis because 3 facilities refused participation, 5 had no patient records, and 3 were closed.

†These women were treated in a medical facility by a physician other than an obstetrician.

‡Percentages of preventable deaths are given as percentage of total deaths.