

are not permitted to perform obstetrical procedures. Finally, while perinatal and infant mortality rates in Japan are the lowest worldwide,¹³ maternal mortality is relatively high. For example, the reported maternal mortality rates in 1990 for Japan, the United States, United Kingdom, and Canada were 8.6, 8.2, 7.6, and 2.4 per 100 000 live births, respectively,¹³ and absence of cross-checking for deaths from sources other than death certificates in Japan suggests the true rate is even higher.

The Confidential Inquiry into Maternal Deaths Research Group (CIMDRG) was created in 1995 to study ways of reducing maternal mortality. The group investigated the history of each maternal death during a 2-year period, identified factors associated with maternal mortality, and made recommendations for reducing maternal mortality. This inquiry was initiated by the Japanese Ministry of Health and Welfare because of concern about the high rate of maternal mortality in Japan. One of the authors (K.N., director of the group) recruited the 14 additional members based on their expertise and interest in reduction of maternal mortality. The CIMDRG participants only received financial support for research-associated expenses.

METHODS

The group systematically investigated circumstances of known maternal deaths by examining death certificates, scrutinizing the circumstances of each death, and assessing its preventability.

Comprehensive Investigation of Maternal Deaths

Although laws governing vital statistics restrict their use to calculating death statistics, after 9 months of negotiations, the CIMDRG successfully petitioned the Japanese government for permission to examine all maternal death certificates from the study period. Since government approval had been granted to conduct the investigation, approval of institutional review boards of the target hospitals or surrogates was not

sought. All efforts were made to protect participant confidentiality. Cases meeting the *International Classification of Diseases, Ninth Revision (ICD-9)* maternal death definition, "the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration of pregnancy or its management, but not from accidental or incidental causes" qualified for this investigation.¹⁴ Death certificates do not require indication of current or recent pregnancy, and no other sources of maternal deaths were identified.

Using the contact information contained in the death certificates, we telephoned the medical facilities that provided medical care to the study participants at any time during the pregnancy; for deaths that occurred outside a medical facility, we contacted the office of the coroner. After explaining the study and obtaining consent for participation by phone, we mailed a questionnaire to the physician, facility representative, or coroner contacted. The 59-page questionnaire contained approximately 600 questions and elicited detailed information about the clinical history of each death, facility characteristics, what personnel participated in the patient's care, and the available daytime and nighttime staffing and laboratory services. Two weeks after mailing the questionnaire, a CIMDRG researcher visited the medical facilities or coroner's office to investigate the case by reviewing the questionnaire and interviewing individuals knowledgeable about the case.

We calculated demographics and maternal mortality rates. Medical facilities were divided into 3 groups: *nontransferring* facilities were sites where patients received all their care in the same facility and died with no history of transfer; *transferring* medical facilities provided initial care, then transferred the patient to a *receiving* facility, where patients ultimately died. Nontransferring hospitals were generally larger than transferring facilities, while receiving facilities were the largest. We examined the distribution of

maternal deaths by facility and pattern of transfer; medical facility characteristics; staffing and facility operating patterns; and availability of laboratory and diagnostic services. We determined the obstetrical characteristics and causes of the maternal deaths.

Preventable Maternal Deaths

The CIMDRG invited national authorities renowned for clinical expertise to participate in a Preventability Assessment Committee. This committee for determining preventability of maternal deaths included 42 medical specialists in obstetrics and gynecology, anesthesiology, neurosurgery, emergency medicine, and pathology. At the outset, the committee determined that a mistake or error must have occurred for an event to qualify as preventable. During four 3-day sessions, the records of all 197 women who received care in a medical facility and died and for whom records were available were reviewed 1 at a time by the committee.

To maximize consistency in evaluation, cases were clustered according to cause of death. The CIMDRG member who investigated the death presented to the committee the case history, physical findings, diagnostic results, autopsy findings, and associated interview data. After in-depth group discussion of each case, each member anonymously voted on the preventability of death for each case. Committee members assigned 1 of 4 preventability categories: (1) impossible to prevent; (2) difficult, but possible to prevent; (3) not difficult to prevent; and (4) indeterminable. For study purposes, the conservative criteria for a preventable death were defined as no committee member selected *impossible to prevent* and at least 70% of committee members chose *not difficult to prevent*. Each committee member assessed for deficiencies in ambulatory and hospital care and whether the care met a basic community practice standard. Seventy percent or more of the committee members had to agree to conclude failure to meet the basic community practice standard.