Deep venous thrombosis (DVT) is an important problem because of its sequelae, venous insufficiency and pulmonary embolism (PE). Among patients hospitalized on a general internal medicine ward (excluding postoperative DVT), the prevalence of DVT not accompanied by PE was 3.17%. Others reported a prevalence that was an order of magnitude lower. At Kaiser Permanente Hospitals in California, the prevalence of DVT among hospitalized patients was 0.10%, but only a primary discharge diagnosis of DVT was listed. A prevalence of 0.18% was reported in Assir Central Hospital in Saudi Arabia. Lower prevalences of DVT were reported in Asian hospitals, but venous thromboembolism has been reported to be uncommon among Asians. To further evaluate the prevalence of DVT in a general hospital, the present investigation was undertaken.

**Materials and Methods**

A computer search was made of discharge diagnoses of DVT among all patients hospitalized at St. Joseph Mercy Oakland, Pontiac, MI, during a 2-year period from July 1, 1998, through June 30, 2000. St. Joseph Mercy Oakland is a general hospital with a published sample census of 269 patients. It is designated by the American College of Surgeons as a teaching-hospital category cancer center. It is also a trauma center; it is not a burn center. There is no fixed policy for prophylaxis against DVT. Patients undergoing orthopedic surgery for hip or knee replacement in general receive prophylaxis with low-molecular-weight heparin followed by warfarin. Compression ultrasound is not done routinely for surveillance before patients are discharged after orthopedic procedures. The distribution of patients on various services was medical 44%, surgical 56%, and orthopedics 3%.

All patients with a discharge diagnosis of DVT based on the International Classification of Disease, Ninth Revision, Clinical Modification (ICD-9-CM) diagnostic codes were identified.
The following codes were used to search for patients who might have DVT: 451, phlebitis and thrombophlebitis; 451.0, femoropopliteal vein, saphenous vein; 451.1, of deep vessels of lower extremities; 451.11, femoral vein deep; 451.19, popliteal vein, tibial vein, other; 451.2, of lower extremities; 451.8, of other sites; 451.81, iliac vein; 453.0, hepatic venous thrombosis; 453.1, thromboembolism migrans; 453.2, vena cava; 453.8, other specified sites; 671.3, deep vein thrombosis antepartum; and 671.4, deep venous thrombosis postpartum. Confirmation of the diagnosis of DVT was made by reviewing the medical records of each patient. A report of a diagnostic venous compression ultrasound or contrast venogram was required unless the physician’s note indicated that a positive test result had been obtained prior to hospital admission. Neither contrast-enhanced spiral CT nor magnetic resonance angiography were used locally for the diagnosis of DVT during the period of registration. Only the first hospital admission for DVT was included in the analysis if the patient had more than one hospital admission for DVT. The age of the patient was recorded as the age at the time of the first hospital admission for DVT. The association of PE with DVT was indicated. The prevalence of PE during this period at the same hospital has been reported, and the method for identification of PE was described.11

The calculated prevalence of DVT depends on the extent to which all laboratory records are searched. Misclassification of patients represents a major problem for investigators working exclusively from ICD-9-CM coded data.12 Misclassification based on ICD-9-CM coded diagnoses can result from overestimates of the diagnosis due to inclusion of patients with unsubstantiated diagnoses as well as underestimates of DVT diagnosed by positive test findings that are not listed on the ICD-9-CM discharge codes.13 Therefore, in addition to a search of the records of patients with a discharge diagnosis of DVT, records of all patients who underwent venous ultrasound or contrast venography were reviewed.

The lack of vein compressibility during compression ultrasonography was considered diagnostic of DVT. The contrast venograms required an intraluminal filling defect or identification of an embolus obstructing a vessel for the diagnosis of DVT.

We limited our survey to proximal DVT. The ultrasonic diagnosis of DVT of the calf veins is less reliable than the proximal veins.14 Ultrasonic imaging of isolated calf vein DVT has been investigated only to a limited extent, and all ultrasonic devices performed poorly.15

### Statistical Analysis

Ninety-five percent confidence intervals (CIs) were calculated using the normal approximation to the binomial distribution. Probability values < 0.05 were considered significant.

### RESULTS

During the 2-year study period, there were 44,136 patients admitted to the hospital, including newborns. The prevalence of DVT was 271 of 44,136 patients (0.61%; 95% CI, 0.54 to 0.69%). The basis of the diagnosis of DVT was compression ultrasound in 270 patients and contrast venography in 1 patient. DVT was associated with PE in 57 of 271 patients (21.0%; 95% CI, 16.3 to 26.4%). The youngest patient with DVT was 21 years old. Among adult patients (≥ 20 years old), the prevalence of DVT was 271 of 34,567 patients (0.78%; 95% CI, 0.69 to 0.85%). Among adult men, the prevalence of DVT was 117 of 13,722 patients (0.85%; 95% CI, 0.71 to 1.02%); among adult women, the prevalence was comparable: 154 of 20,845 patients (0.74%; 95% CI, 0.63 to 0.86%) [Table 1].

Among adults aged 20 to 49 years, the prevalence of DVT was higher in men than women: 19 of 3,982 patients (0.48%; 95% CI, 0.29 to 0.74%) vs 22 of 9,442 patients (0.23%, 95% CI, 0.15% to 0.35%), respectively (p < 0.02). Among patients ≥ 50 years old, the prevalence of DVT in men was 98 of 9,740 patients (1.01%; 95% CI, 0.82 to 1.22%), and in women was 132 of 11,403 patients (1.16%; 95% CI, 0.97 to 1.37%) [not significant].

In adults, the prevalence of proximal DVT in African Americans was 30 of 4,344 patients (0.69%);
Table 2—Prevalence of DVT According to Race and Sex in Patients ≥ 20 Years Old

| Groups               | Hospital Admissions, No. | DVT, No. (%) | 95% CI | 95% CI, 0.47 to 0.98% | and in whites was 240 of 28,615 patients (0.84%; 95% CI, 0.74 to 0.95%) [not significant]. The data among Asian Americans were sparse. Among adult Asian Americans, the prevalence of DVT was 1 of 195 patients (0.51%; 95% CI, 0.01% to 2.82%) [Table 2].

**DISCUSSION**

The prevalence of DVT among adult patients (0.78%) in a community/teaching general hospital that we observed was lower than the prevalence reported by Schuurman and associates1 on an internal medicine ward (3.17%). Whether the discharge letters, on which the diagnosis in their survey was based, included patients with an unsubstantiated clinical diagnosis is uncertain. We required that all diagnoses of DVT be confirmed by an objective test. Others reported considerably lower prevalences (range, 0.10 to 0.18%).2,3 The low prevalence of DVT among hospitalized patients reported by Klatsky and associates2 reflects their search for DVT as a primary discharge diagnosis. A search for DVT among all listed discharge diagnoses would have shown a higher prevalence. In Asian hospitals, the reported prevalence of DVT was even lower.1,5

Whether the prevalence of DVT that we observed among hospitalized patients is representative of other hospitals is uncertain, in view of the sparse literature. However, the prevalence of PE at this hospital was well within the range reported elsewhere. During this same period, we observed documented PE in 0.27% of hospitalized patients.11

The prevalence of DVT that we observed was a conservative estimate. Patients were not included based on a clinical diagnosis without objective confirmation.

We showed a higher prevalence of DVT among adult men < 50 years old than among adult women the same age. In the Prospective Investigation of Pulmonary Embolism Diagnosis,1,3 PE also was more prevalent in adult men ≤ 50 years old than in adult women the same age.

ACKNOWLEDGMENT: We thank Dr. Ibetsum Rafeea and Rebecca G. Estrelada for their contributions to the article.

REFERENCES