Summary

**Background** The wide variations in reported incidence and mortality rates reflect gaps in the epidemiology of venous thromboembolic disease (VTD), a clinical entity with two different manifestations – deep vein thrombosis and pulmonary embolism. We reviewed recent studies and data sources to find the most useful estimates of its epidemiologic indicators in France.

**Methods** We used international medical databases to conduct a systematic literature review. Our search focused on the incidence and mortality rates of VTD in France and examined epidemiologic studies, autopsy studies, clinical trials, and national morbidity and mortality databases.

**Results** The annual incidence of deep vein thrombosis is approximately 120 per 100,000 in France and 60-100 per 100,000 worldwide; the annual incidence of pulmonary embolism, the principal serious complication of deep vein thrombosis, is between 60 to 111 per 100,000 in France and between 23 and 107 per 100,000 internationally. The reported mortality rate for VTD in France is 7.2 per 100,000, but estimates from international autopsy series suggest a pulmonary embolism prevalence among hospital patients of 0.8 to 1%.

**Conclusion** This study demonstrates the limitations of current epidemiologic knowledge about VTD. Improved information about this disease requires better case reporting and large population-based longitudinal cohort studies.

**DATA SOURCES**

**Epidemiologic studies** The French epidemiologic studies selected were all observational cross-sectional investigations of general populations, except for separate data for outpatients and at-risk populations (hospitalized patients). Four North American and two Swedish studies were also selected: all were longitudinal and all but two studies of hospitalized patients provided estimates from the general population.
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### Autopsy studies

These retrospective studies, conducted between 1960 and 1990 in patients who died in the hospital, come mainly from English-speaking and Nordic countries. Several approaches were distinguished: studies aimed only at determining the number of cases of pulmonary embolism (PE) observed during autopsy without exploring causes of death and studies that distinguished fatal PE (direct cause of death) from those that contributed to the death. A single study separately identified incidental PE, unrelated to the death.

### Treatment trials

Five large meta-analyses examined the principal clinical trials of antithrombotic prophylaxis published between 1992 and 2000. These studies assessed mortality attributable to VTD either directly, with a fatal PE rate, or indirectly, by comparing overall mortality within the patient groups.

### National morbidity and mortality databases

French morbidity data for the general population come from the Credes survey (which measured household healthcare service consumption); the national medical informatics program (PMSI) compiles hospital data. INSERM publishes the French cause-of-death data, based on death certificates.

### Principal international epidemiologic data

According to the estimates accepted by the 1997 consensus conference on the prevention of venous thromboembolic accidents, the annual incidence of DVT was 160 per 100,000, that of symptomatic (but not fatal) PE 20 per 100,000, and that of fatal PE (diagnosed post-mortem) 50 per 100,000. Anderson et al. report an annual incidence of 48 per 100,000 for DVT and 23 per 100,000 for PE. Given the proportion of VTD cases that are not hospitalized, they also consider that the annual incidence of DVT in the United States general population is probably around 245 per 100,000, an estimate fairly close to that of the Canadian study, but higher than that of the Swedish and other American studies. The overall rate of PE in the large autopsy series ranges from 2.5% to 31.7%, and the rate of fatal PE from 2.1 to 28.9%. Bergqvist et al. observed a rate of incidental (nonfatal) PE of 44.5%.

If we assume that the risk of thromboembolism for a hospitalized patient is independent of the risk of being hospitalized in case of death, we can rely on the results of autopsy studies to estimate the prevalence of PE among hospital patients. When we apply the global PE rate observed in the autopsy series to all of the patients hospitalized during the study period, the prevalence of PE among hospitalized patients ranges between 0.8% and 1%. Figure 2 reports the mortality rate of PE observed in the principal meta-analysis.
lys. Depending on the antithrombotic prophylaxis used, the overall mortality rate ranged between 0.527 and 6.5%, and the rate of fatal PE between 0%28 and 26%27.

Discussion

The incidence of PE reported by the PMSI33 is quite similar to that in the Credes study32. These French estimates are fairly close to the population-based rates for other countries. On the other hand, the PE rate from the prospective population-based Epi-Getbo study4 is less than half of these. Extrapolating these figures to the French population (59,096,259 persons in 1999), with an incidence rate between 60 and 100 per 100,000 and a lethality rate of 10% indicates that PE in France accounts for 35,000 to 66,000 new cases annually and causes 3,500 to 6,600 annual deaths. The upper range of this estimate appears closer to reality. The estimates of DVT incidence are much more scattered and vary by a factor of 10; figure I suggests that the Credes values are strongly overestimated and that the Epi-Getbo4 study results, which are close to those of international-population-based studies, should be accepted instead. These two manifestations of VTD – deep vein thrombosis and pulmonary embolism – are not always considered separately; depending on the study, sometimes the first event diagnosed is the one that characterizes the VTD. The variation in the methods used to detect DVT and PE often prevents comparison between studies. While prevention practices improved consistently over time, they varied from one country to another. This review summarizes available epidemiologic data about VTD, which can best be described as a patchwork quilt of varying populations, study methods and results.

The data in the observational studies are most reliable when the population studied corresponds to a representative sample of the general population, when the diagnostic criteria employed are recognized and when diagnostic examinations are systematically performed. A selection bias is unavoidable in autopsy studies: the autopsies are not performed systematically and the population studied (hospital patients) is generally older or sicker than the general population.

Although randomization makes the estimates from the clinical trials more reliable, the population is still hospital-based and selected for thromboembolic risk factors or according to specific eligibility criteria. The morbidity and mortality databases have the advantage of yielding estimates that are not biased because they are based on systematic and exhaustive case reporting.

Conclusion

Improvement in epidemiologic knowledge of VTD worldwide requires more uniform and exhaustive case reporting. Only large longitudinal cohort studies in the general population can supply the reference rates of incidence and mortality that are essential to any epidemiologic approach to this condition.
S Y S T È M A T I C R E V I E W

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References


22. SCB Inserm. Statistiques des décès. 44 chemin de ronde. 78116 Le Vesinet.


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