Economic burden of cancer associated thrombosis in Germany - Findings and extrapolations

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Background

Despite thrombosis being a relatively common co-morbidity in several types of cancers, there are only a few studies on the economic burden of cancer-associated thrombosis (CAT) worldwide. The aim of this study was to analyze the patients with who experience a CAT, and to calculate the associated total health utilization costs in Germany.

Methods

Patient´s data (e.g. anticancer medication, hospitalizations, oncological services etc.) were sampled under real-world conditions in 26 German oncological practices by reviewing and evaluating every medical record from each patient. The data includes both inpatient and outpatient patients. The analysis included 2,361 patients with colorectal (CRC – 21%), breast (BC – 42%), lung (LC – 21%) and prostate cancer (PC – 16%) who received at least one systemic antitumor treatment in 2014-2015. The total health utilization and costs were analyzed for different patient groups (all patients vs. patients with CAT vs. patients without CAT) and for cancer types. The mean duration follow up was 41 months.
Hereafter; a cost modeling exercise was undertaken in order to reflect the national economic and humanistic burden in Germany. The incidence of CAT was established from available literature which reflected the annual incidence of CAT based on all cancer types (2). The number of deaths related to CAT was as well established via available literature (6-7). An extrapolation to other countries was tested in order to outline the usefulness of this data-set to estimate the burden of CAT in other countries. This was done by applying other local cost units which were adapted from available literature (14-19).

Results

The analysis included 2,361 cancer patients and 407 patients (17%) developed a CAT and were treated with antithrombotic medication. In total 407 hospitalizations (9.8% due to venous thromboembolism (VTE)) with a mean length of 10 days (8 days with a cause of VTE) were found. The total annual health utilization costs per cancer patient with CAT were in mean 16,199 EUR. The distribution of costs were: 20% for hospitalizations, 11% for medical CAT therapies and 69% for non-CAT related services or medications (treatments for cancer). 59% of the patients who experienced a CAT were hospitalized with a total length of 17 days over a mean of 1.7 inpatient stays during the 41 months.

The costs for patients without CAT amounted to an annual mean of 12,870 EUR. Distribution of costs were different than those patients with CAT, mainly due to a lower cost of hospitalization (12.4%) and no cost of medical treatment of CAT (0%). Treatments and other medical therapies accounted for 87.6%. The cost difference between the two groups thus amounts to 3,329 EUR. This added cost is constitutes and extra cost of 26% per cancer patient who experiences a CAT.

Discussion

Current literature reflects incidence rates that takes all cancers into consideration indicating crude rates of annual incidence of CAT in cancer patients range between 1-2% (2-4;8-9;11-12). Thus estimating the economic burden of CAT on a national scale, the annual incidence rate is applied here as it is reported in the current literature, where it is based on "all cancers" (2-4;8;11-12). In order to assess mortality, estimates can be applied from available literature (6-8), outlining that 3% of cancer patients' death can be considered to be CAT-related (7-8).

Economic burden of disease	Germany
Cancer prevalence (1)	3,135,408
Annual incidence of CAT (2)	37,625
No. of cancer patients dying from cancer each year (6)	217,636
Number of cancer patients' death which was related to CAT (7)	6,529
The added cost of CAT (only) per patient per year	EUR 3,329
% added by CAT on top of cancer per patient	26 %
National CAT cost (CAT only) per year	EUR 125,253,263

The estimations based on the available literature as well as the current data set are comparable to the findings in the available literature. The added cost of CAT is around 3,330 EUR per patient per year and reflects a cost of CAT in Germany which exceeds 125 mEUR every year.

The economic burden of VTE has before been estimated to 1,350 EUR pr patient (13) and estimated to range between 1,614 EUR to 5,309 EUR per patient per year (10). It is estimated that European cost of illness for VTE (all VTE not CAT exclusively) to be between 0.5 bEUR to 13.2 bEUR per year (20). Approximately 15-20% is estimated to be CAT which would make CAT account for an annual cost between 0.1 bEUR to 2.64 bEUR in Europe.

Extrapolation to other countries:

The data is useful to assessing the cost of CAT in Germany and it outlines the potential to extrapolate to other countries in order to assess the humanistic and economic burden on a broader geographical scale. This extrapolation is done with the purpose of outlining the potential to save lives and avoid a substantial extra costs which is associated with CAT. The extrapolation was done by using the same approach for estimating prevalence, incidence and mortality as in the calculation for Germany. Hereafter, local costs were applied for the main cost-drivers cancer medication and hospitalization (which represented 80% of the costs); estimates for the cost associated with treating the CAT is comparable across countries. . UK, Canada, Spain and France were tested for extrapolation.

Economic burden of disease	United Kingdom	Canada	Spain	France
Cancer prevalence (1)	2,500,000	1,403,931	1,825,813	2,471,504
Annual incidence of CAT (2)	30,000	16,847	21,910	29,658
No. of cancer patients dying from cancer each year (6)	162,000	78,000	102,762	154,572
Number of cancer patients' death which was related to CAT (7)	4,860	2,340	3,083	4,637
Cost of CAT (only) not incl. cancer per patient per year	EUR 3,437 (14-15)	EUR 5,345 (18-19)	EUR 3,525 (16)	EUR 4,071 (17)
% added by CAT on top of cancer per patient	30 %	29 %	30 %	33 %
National CAT cost (CAT only) per year	EUR 103,116,618/ GBP 89,505,224	EUR 90,039,941/ CAD 130,197,754	EUR 77,227,933	EUR 120,744,693

Conclusions

The economic burden of CAT is substantial, as the majority of CAT patients were hospitalized for a longer period of time. Costs for CAT therapies (including medication and inpatient CAT therapy) were only 11% of the total costs in patients during the period in which patients were receiving anticancer therapy, and hospitalization were 19% of the total cost of a CAT patient. The 3,329 EUR per patient in Germany reflects a cost-increase of 26% compared to the patient without CAT. The national burden in Germany is assessed to exceed 125 mEUR per year. The data set could be utilized to support an extrapolation of the cost of CAT to other countries in order to estimate the cost of CAT on a larger scale. Further research within this area could clarify the humanistic burden and economic burden on a broader scale, leading to an increased awareness and adherence to clinical guidelines and improved patient and treatment outcomes.

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