Scientific studies

Improvement of patients’ access to insurance and credit using statistical cure models and cancer registries data

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AOS6
Track 3
No conflict of interest
Improvement of patients’ access to insurance and credit using statistical cure models and cancer registries data

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- **FRANCIM Study**: common database from 17 cancer registries.
- **Financed by INCa and LabEx LipSTIC (Dijon - France)**
- **Collaborative:**
  1. Registre Bourguignon des Cancers Digestifs
  2. Registre des cancers de l’Isère
  3. Registre des Hémopathies Malignes de Côte d’Or
  4. Hospices Civils de Lyon, Service de Biostatistique
Cancer and insurance in France

- In France 3M people with cancer → insurance and credit difficulties.
- Time to surtax-free insurance = 10 yrs. (law in 2015): needs to be improved.

What actually happens?

**Insurance rates of those diagnosed with cancer should be the same as that of general population when observed MR = expected MR i.e. excess MR = 0 i.e. net survival (NS), survival that corresponds to excess MR, flattens off: patients are “cured”**

Aim of the study: estimate $T$ the time to statistical cure
Method and key parameters

- First of all it is checked that cure is a reasonable assumption
- Cure model (*Andersson et al., 2011*), based on excess mortality methodology, is used to estimate the NS of patients with cancer through the estimation of
  - \( P = \) proportion of cured patients
  - \( S_u(t) = \) NS of uncured patients
- \( \pi_i(t) = \) a patient chance of being cured at a given time \( t \) is derived as the ratio of \( P \) and NS
- Data are stratified by sex and model adjusted on age at diagnosis

**Time to cure estimation:**

- By \( T_{95} \), the time at which 95% of death due to cancer have occurred i.e. \( S_u(T_{95}) = 0.05 \)
- By \( T_{\pi95} \), the time at which \( \pi_i(t) \) reaches 95% i.e. \( \pi_i(T_{\pi95}) = 0.95 \).
  \( T_{\pi95} \) gives better estimation of time to cure.
Data

- FRANCIM database: solid tumors (38 localisations, N = 396,482) and haematological malignancies (18 localisations, N = 43,112).

- Expected MR from INSEE.

- Diagnosis period: [1995, 2010].

- Age at diagnosis: [15, 75] yrs.

- Followed-up until June 30, 2013.
Results (1)

Laryngeal cancer (male):
Excess MR never close to 0 $\rightarrow$ continuous and dramatic decrease of NS $\rightarrow$ No cure
Results (2)

Colorectal cancer (female): excess MR close to 0 from 8/9 yrs after diagnosis $\rightarrow$ assumption of cure and $\pi_i(t) > 0.95$ from 8/9 yrs after diagnosis hence $T=8.29$; $T=8.55$; $T=8.47$; $T=8.76$ yrs.
**Results (3)**

Testicular cancer: excess MR almost 0 less than 1 yr after diagnosis → observed MR almost the same as expected MR → assumption of cure and $\pi_i(t) > 0.95$ from 0 yr after diagnosis hence $T \approx 0$ yr.
Conclusion

- *When cure is a reasonable assumption*, registries data and cure models can be used to estimate time to cure and therefore to improve time to surtax free insurance.

- A good estimate of time to cure is the one obtained by the mean of the estimated patient’s chance of being cured. (However work in progress to improve the estimation methods)

- Cure time varied with cancer site, age and sex. It was lower than 10 years for numerous sites: Time to surtax free insurance should be reassessed for each site according to newly estimated time to cure.
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