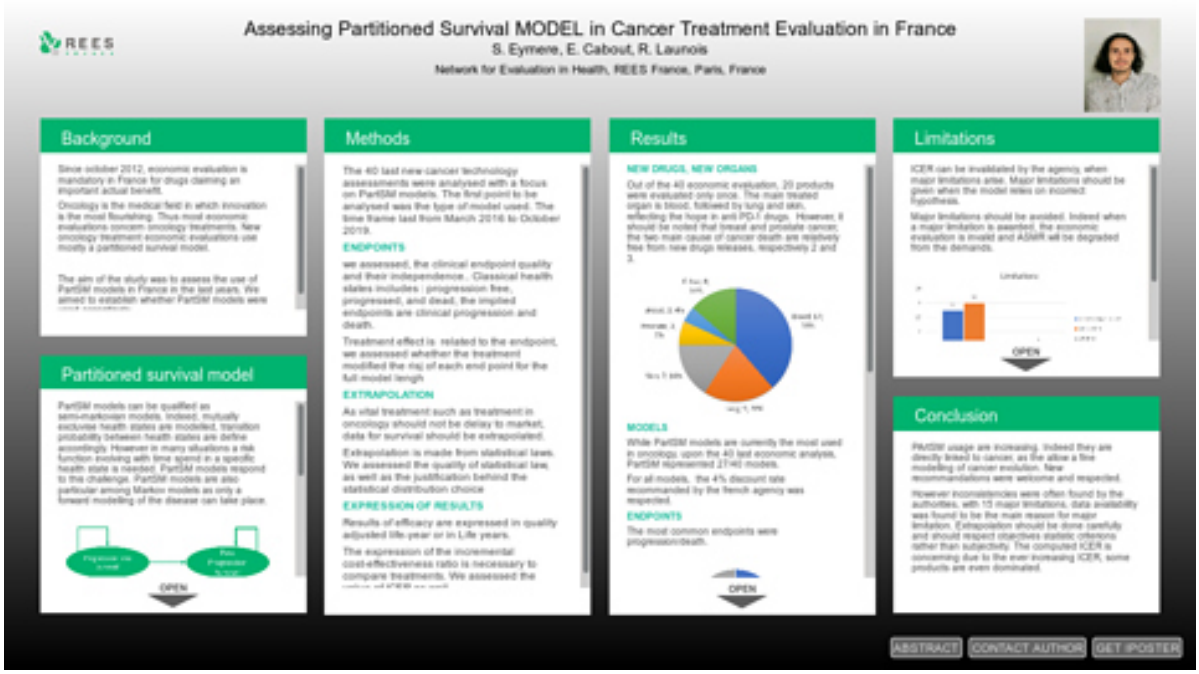
Assessing Partitioned Survival MODEL in Cancer Treatment Evaluation in France



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PRESENTED AT:

BACKGROUND

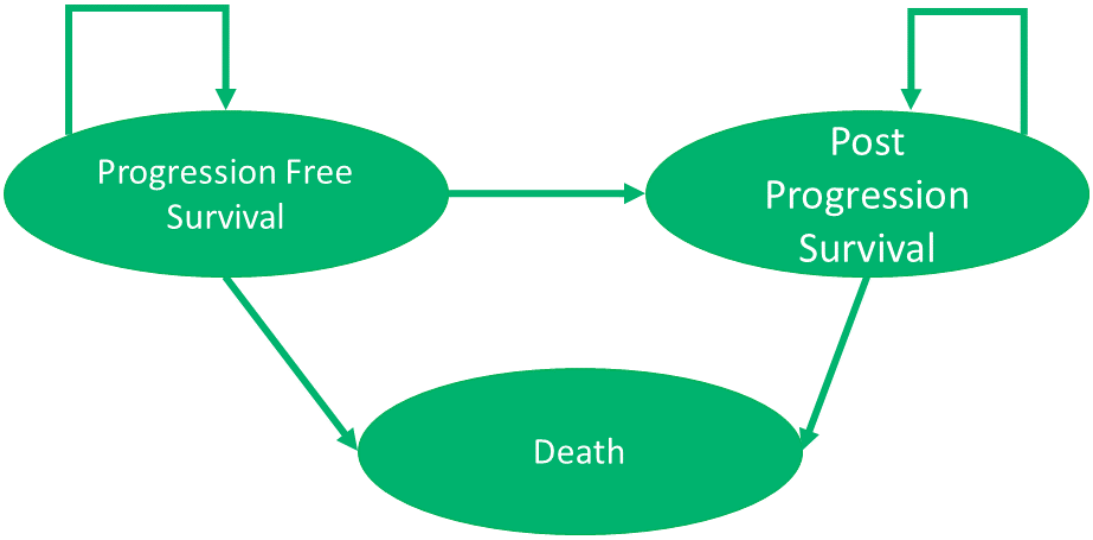
Since october 2012, economic evaluation is mandatory in France for drugs claiming an important actual benefit.

Oncology is the medical field in which innovation is the most flourishing. Thus most economic evaluations concern oncology treatments. New oncology treatment economic evaluations use mostly a partitioned survival model.

The aim of the study was to assess the use of PartSM models in France in the last years. We aimed to establish whether PartSM models were used accordingly.

PARTITIONED SURVIVAL MODEL

PartSM models can be qualified as semi-markovian models. Indeed, mutually excluvise health states are modelled, transition probability between health states are define accordingly. However in many situations a risk function evolving with time spend in a specific health state is needed. PartSM models respond to this challenge. PartSM models are also particular among Markov models as only a forward modelling of the disease can take place.



In a PartSM model, patients transition between different healthstate differ from a MarkovModel. In cancer drugs economic evaluation traditionnaly models entails three health states : survival before progression, survival after progression, and death.

PartSM models are essential tools in economic evaluation of oncology treatment, and are often subject to limitations. The aim of the study is to assess whether these limitations are impacting results in the French HTA setting.

METHODS

The 40 last new cancer technology assessments were analysed with a focus on PartSM models. The first point to be analysed was the type of model used. The time frame last from March 2016 to October 2019.

ENDPOINTS

we assessed, the clinical endpoint quality and their independence.. Classical health states includes : progression free, progressed, and dead, the implied endpoints are clinical progression and death.

Treatment effect is related to the endpoint, we assessed whether the treatment modified the risj of each end point for the full model lengh

EXTRAPOLATION

As vital treatment such as treatment in oncology should not be delay to market, data for survival should be extrapolated.

Extrapolation is made from statistical laws. We assessed the quality of statistical law, as well as the justification behind the statistical distribution choice

EXPRESSION OF RESULTS

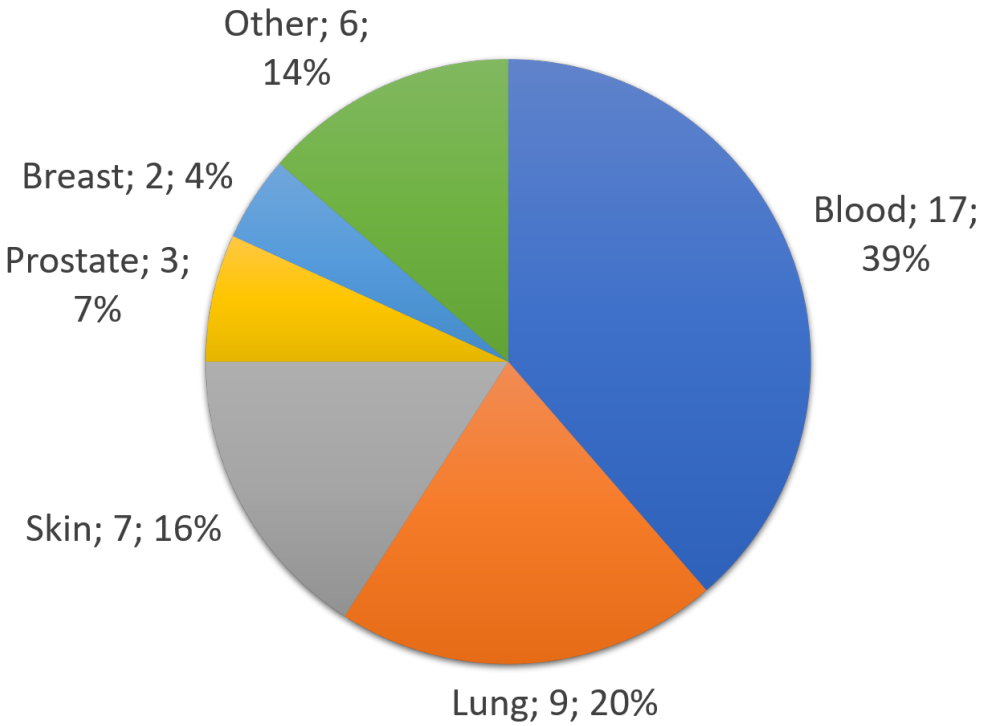
Results of efficacy are expressed in quality adjusted life-year or in Life years.

The expression of the incremental cost-effectiveness ratio is necessary to compare treatments. We assessed the value of ICER as well.

RESULTS

NEW DRUGS, NEW ORGANS

Out of the 40 economic evaluation, 20 products were evaluated only once. The main treated organ is blood, followed by lung and skin, reflecting the hope in anti PD-1 drugs. However, it should be noted that breast and prostate cancer, the two main cause of cancer death are relatively free from new drugs releases, respectively 2 and 3.



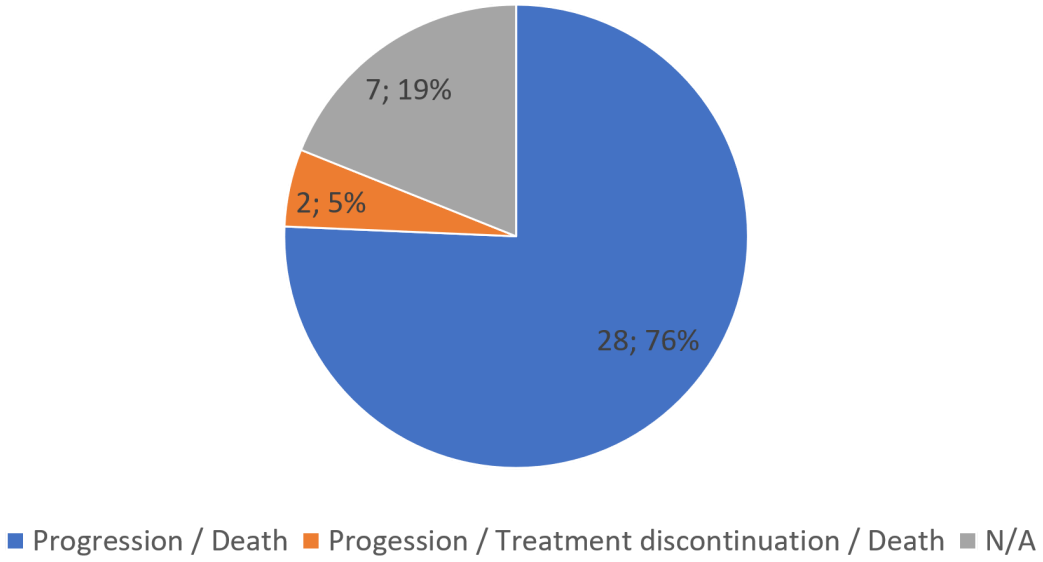
MODELS

While PartSM models are currently the most used in oncology, upon the 40 last economic analysis, PartSM represented 27/40 models.

For all models, the 4% discount rate recommanded by the french agency was respected.

ENDPOINTS

The most common endpoints were progression/death.



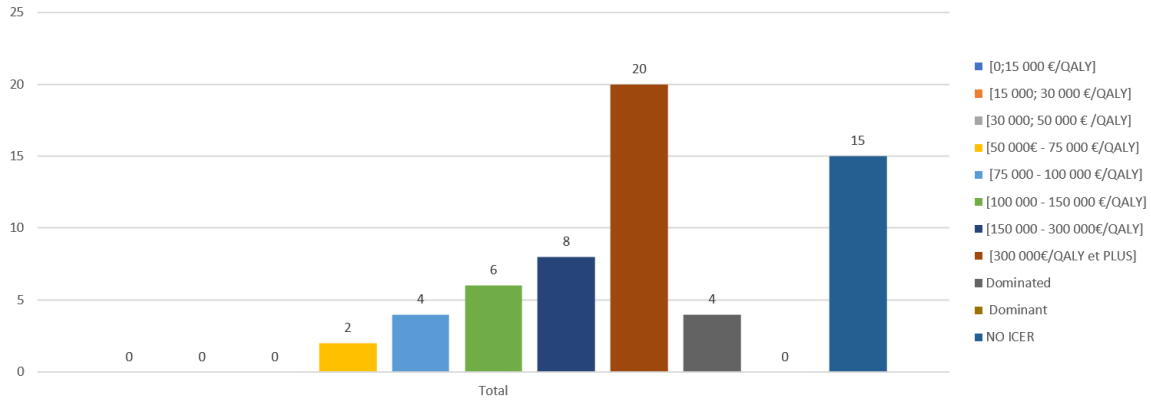
EXTRAPOLATION

The most common method for fitting the extrapolation was using statistical criterions AIC and BIC. (20/40). Suprisingly, resorting to expert opinion was used, (3/40) This method was not presented 12/40 times.

Statistical distribution is related to the data. The most used is Weibull distribution (9/40)

ICER

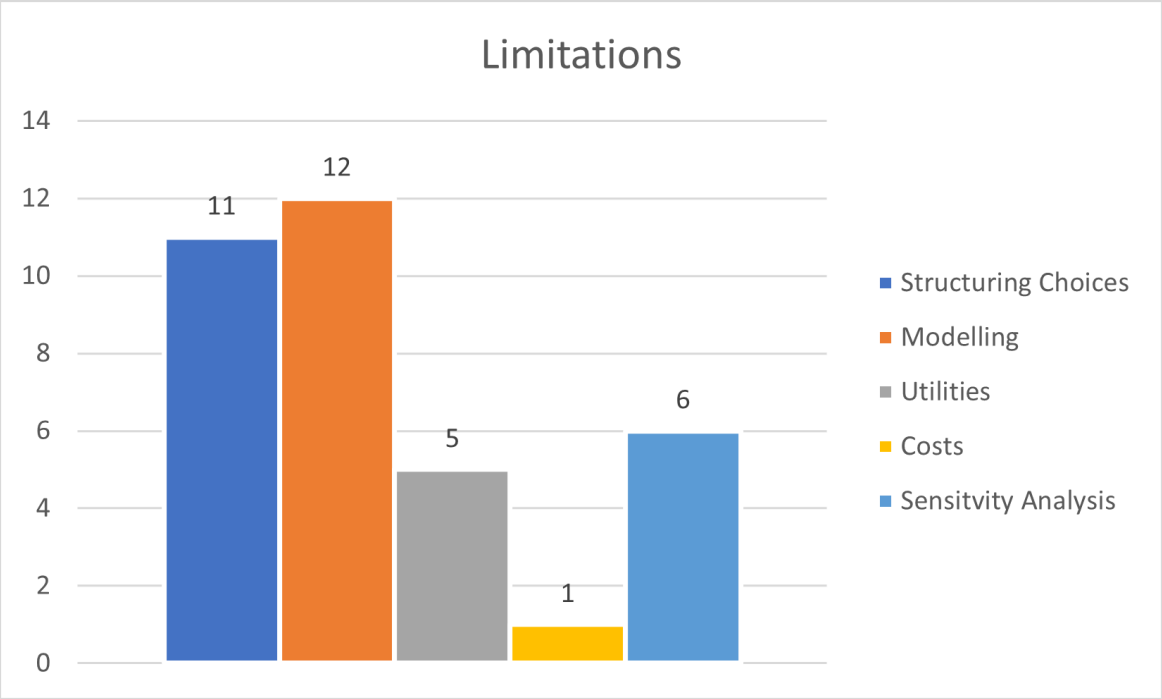
ICER is public when no major limitation were found. ICER was invalidated by the french agency (15/40). The intervention was found to be dominated (4/40).



LIMITATIONS

ICER can be invalidated by the agency, when major limitations arise. Major limitations should be given when the model relies on incorrect hypothesis.

Major limitations should be avoided. Indeed when a major limitation is awarded, the economic evaluation is invalid and ASMR will be degraded from the demands.



CONCLUSION

PArtSM usage are increasing. Indeed they are directly linked to cancer, as the allow a fine modelling of cancer evolution. New recommandations were welcome and respected. However inconsistencies were often found by the authorities, with 15 major limitations, data availability was found to be the main reason for major limitation. Extrapolation should be done carefully and should respect objectives statistic criterions rather than subjectivity. The computed ICER is concerning due to the ever increasing ICER, some products are even dominated.

ABSTRACT

Introduction : Since october 2012, economic evaluation is mandatory in France for drugs claiming an important actual benefit. Oncology is the medical field in which innovation is the most flourishing. Therefore most economic evaluations concern oncology treatments.

New oncology treatment economic evaluations use mostly a partitioned survival model (PartSM) to simulate cancer evolution. Partitioned survival models rely on strong hypotheses and should be integrated in the French framework for economic evaluation.

Methods : From March 2016 to October 2019 the last 40 cancer drug efficiency assessments were analyzed. The type of model was first assessed. Then justification in using such a PartSM was also scrutinized. As in a PartSM, clinical endpoints should be justified we evaluated the presence or lack of justifications.

In order to be able to compare different treatments efficiency, efficacy of existing treatment should be assessed. Efficacy assessment method were checked out. As pivotal trials are usually not finished when the efficiency is assessed, data should be extrapolated. Thus extrapolation method were also analyzed.

Results : Overall data are seldom available, information is missing for every criterion. Out of 40 evaluations, 15 were rejected by authorities due to major limitations. On these evaluation the full review could not have been performed as authorities do not reveal the full information.

Most models use progression and death as endpoints (n=25/33). Efficacy adjustment was made using network meta-analysis (n=20/31) or matched adjusted comparison (n=6/31).

Minimization of AIC and BIC was the commonest method for statistical distribution selection (n=15/29) when extrapolating Kaplan-Meier curves. The proportional risk hypothesis was the most used when extrapolating treatment outcomes (n=24/34).

21 economic evaluations have an estimated ICER, 6 does not due to the new product being dominated.

Conclusion : PartSM models are used however inconsistencies are frequent. Data availability is a major issue.