ECONOMIC EVALUATION METHODS IN ONCOLOGY: ONWARDS AND UPWARDS

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BACKGROUND

- Economic evaluation methods evolve over time.
- To overcome limitations of previous methods, new methods for survival analysis, extrapolation techniques, statistical tests, healthcare resource costing methods, various model structures, and crossover adjustment techniques have been developed.
- Adoption of new methods into economic evaluation practice may not be identical across various jurisdictions.
- Methods heterogeneity can impact health technology decision making.

OBJECTIVES

- To identify and describe the distribution of economic evaluation methods used in practice over time and across jurisdictions.

METHODS

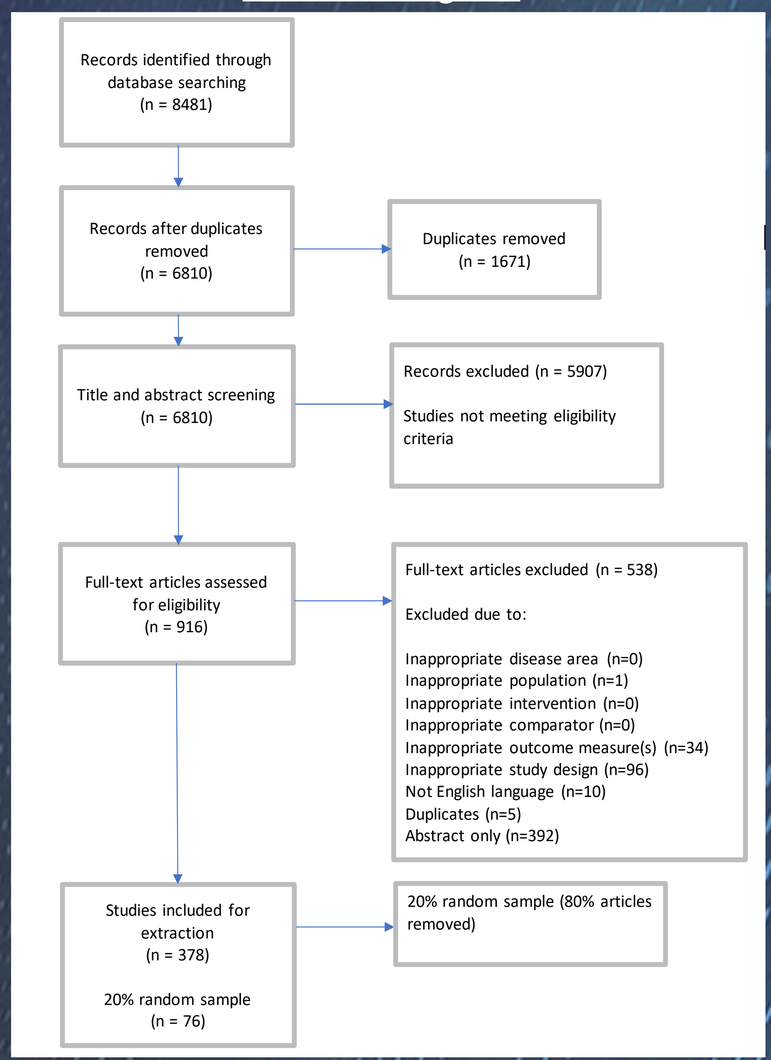
- A systematic search of the published oncology literature was conducted to identify economic evaluations of advanced or metastatic cancers published between 2010-2019 using PUBMED, Ovid MEDLINE, and EMBASE databases using PICOS method.
- Screening of titles and abstracts for relevance to study objectives was conducted based on pre-determined eligibility criteria.
- Full-text articles meeting all inclusion criteria and no exclusion criteria were reviewed.
- Information extracted from each study included: author(s), title, year of publication, disease area, patient population, model type, number of health states, perspective, time horizon, data type, study type, data source(s), intervention(s), comparator(s), treatment line(s), discount rates, outcomes of interest, LYs gained, QALYs gained, total costs, base case ICER, presence/absence of sensitivity analyses, number of probabilistic sensitivity analysis iterations, willingness-to-pay threshold(s), method of extrapolation, curve-fitting techniques, crossover adjustment, funding source, inclusion of economic evaluation guidelines, author's primary conclusion, validation method(s), software, digitization method, and supplementary appendices.
- Data extraction performed based on intention-to-treat (ITT) population, where available.

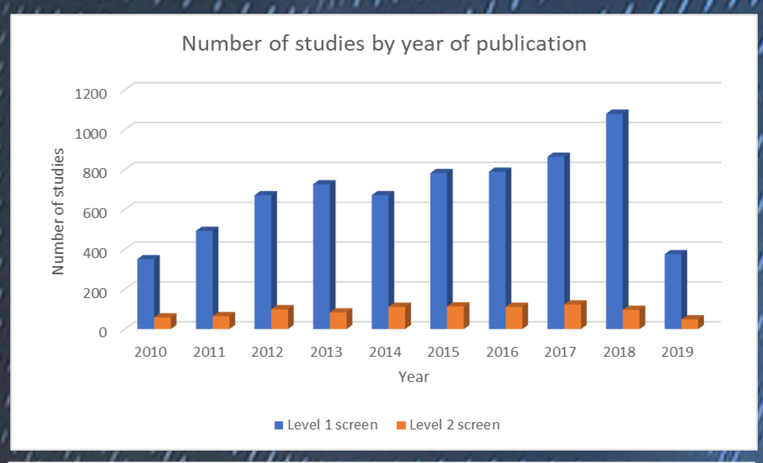
RESULTS

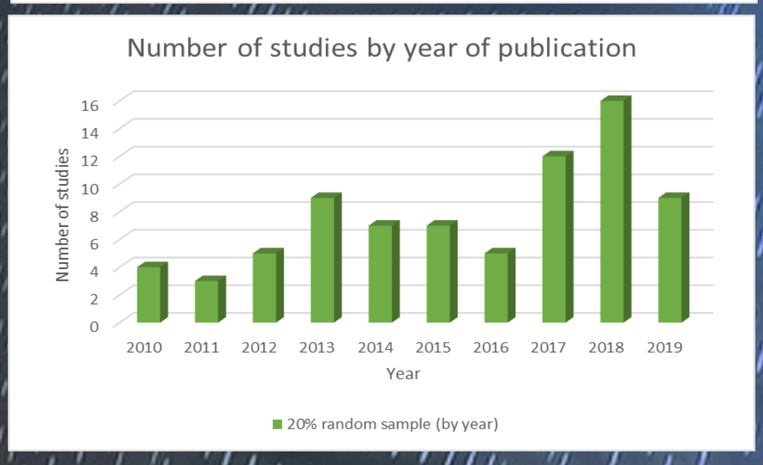
- 8481 abstracts identified through the literature searches.
- 5907 studies excluded in level 1 screening.
- 916 full-text studies assessed using a pre-defined eligibility form.
- 538 studies removed in level 2 screening.
- 378 studies met eligibility criteria.
- To provide a representative snapshot of all identified studies (n=378), a 20% random sample was taken.
- Information extracted from 76 papers, study characteristics described, and then compared across jurisdictions and over time.
- Number of extracted studies (n=76) more than triple that of 2018 publication (n=20) investigating survival modeling methods.

RESULTS (cont'd)

PRISMA diagram







- Increasing number of published studies observed over the 2010-2019 time period.
- Identified studies relatively balanced across disease areas, trend towards disease areas with higher prevalence.

Characteristic	Proportion of studies n (%)
Country	
USA	20 (26%)
UK	12 (16%)
Canada	9 (12%)
China	8 (11%)
Japan	5 (7%)
Netherlands	4 (5%)
Spain	3 (4%)
Taiwan	2 (3%)
Australia	2 (3%)
Other countries (n=1)	11 (14%)
Focus of study	
Lung cancer	14 (18%)
Colorectal cancer	12 (16%)
Breast cancer	10 (13%)
Diagnostics	8 (11%)
Prostate cancer	7 (9%)
Pancreatic cancer	5 (7%)
Other cancer types (n<5)	20 (26%)
Study year	
2010	4 (5%)
2011	3 (4%)
2012	5 (7%)
2013	9 (12%)
2014	6 (8%)
2015	7 (9%)
2016	4 (5%)
2017	13 (17%)
2018	16 (21%)
2019	9 (12%)

RESULTS (cont'd)

Characteristic	Proportion of studies n (%)
Model structure	
CUA	63 (82%)
CEA	13 (17%)
Other	1 (1%)
Model structure	
Markov	36 (47%)
Partitioned survival	13 (17%)
Not reported	7 (9%)
Decision tree	6 (8%)
Combination (decision tree + Markov)	5 (6%)
Other	4 (5%)
Microsimulation	3 (4%)
Discrete event simulation	2 (3%)
Time horizon	
≤1 year	1 (1%)
1-5 years	19 (25%)
6-10 years	18 (24%)
11+ years	9 (12%)
Lifetime	25 (33%)
Not reported	4 (5%)
Reporting of results	
Deterministic sensitivity analysis	58 (75%)
Probabilistic sensitivity analysis	62 (81%)
Cost-effectiveness acceptability curves	43 (56%)
Scenario analysis	22 (29%)
Study perspective	
Public healthcare system	63 (83%)
Societal	5 (7%)
Hospital	5 (7%)
Not reported	3 (4%)

- Most studies were cost-utility analyses.
- Greater sophistication of methods observed in countries with well-developed health technology assessment frameworks.
- ~50% studies utilized Markov models, 25% were partitioned survival models.
- Most common time horizon was lifetime.
- Twice as many studies utilized data from clinical trials than from real-world evidence.
- Studies reporting methods for extrapolation of survival curves typically used fitted parametric distributions.
- Funding sources for time horizon of 10+ years: 47% industry-sponsored, 16% funded through public grants.
- Funding sources for <5 year time horizon: 39% sponsored by industry, 39% funded through public grants.
- Time trend analysis revealed increasing use of sophisticated methods over time (parametric extrapolation, Akaike Information Criterion for parametric curve selection, validation exercises).
- Of the 31 studies reporting extrapolation methods, 84% used fitted parametric curves.
- 76% of industry-funded studies, 50% of studies funded by public grants, and 24% of studies with no funding found the intervention under investigation to be cost-effective.

LIMITATIONS

- Not all studies reported outcomes of interest (e.g. survival extrapolation method, patient crossover percentages, proportional hazards assumption) which limits generalizability of results.
- Only studies written in English included.

CONCLUSIONS

- Sophistication of economic evaluation methods has steadily increased over time, but uptake of new methods has been geographically uneven.
- Heterogeneity in methods uptake may impact economic evaluation results across jurisdictions.
- Results of this study more robust than previous studies as number of extracted studies much higher.

ACKNOWLEDGEMENTS

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