The economic costs of type 2 diabetes: a global systematic review

PharmacoEconomics

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Text Box ESM_2 COI methodologies

Methodologies for COI studies can broadly be categorized into two main categories: (1) estimating the *total* disease costs and (2) estimating the incremental costs [95]. Studies can then be divided further according to the specific approach used for estimation. Our categorization builds on that by Akobundu et al. [95] in their review of COI methodologies.

(1) Total disease costs

Sum-All Medical: captures all medical expenditures of a person diagnosed with diabetes, irrespective of the relation of the expenditures with diabetes.

Sum-Diagnosis Specific: includes the costs that are related to diabetes. This can be done by using a *disease-attributable costing* approach, using administrative claims databases to identify the cost of diabetes by respective *International Statistical Classification of Diseases and Related Health Problems* (ICD) codes that link the expenditures to a primary or secondary diagnosis of diabetes as the reason for the healthcare utilization. Alternatively, a similar technique used at the population level is the *attributable-fraction* approach, where the relative contribution of, e.g., diabetes, to the risk of developing another disease (e.g. renopathy or cardiovascular disease) is used to determine how much of the costs of this disease can be attributed to diabetes.

Survey approach: while not specifically mentioned by Akobundu et al. [95], for this review we create a separate category capturing studies using surveys of people with diabetes. This category differs from the two approaches a) and b) above in that estimations rely solely on the individual, reported experience of people with diabetes, without use of any diagnostic data at an aggregate level. The survey approach was also used as a separate category in the earlier review on diabetes COI studies by Ettaro et al. [3].

(2) Incremental disease costs

There are two main approaches for the estimation of incremental medical costs:

Regression approach: a statistical technique which can account for observable differences between the group with diabetes and the control group (i.e. those without diabetes) to find - ideally - the independent effect of diabetes on healthcare costs. The differences typically accounted for are age, region and gender.

Matching approach: uses a control group to directly compare those with diabetes to those without diabetes after matching each person of the 'treatment' group to a 'similar' person of the control group, using various categories like age, region and gender to – again - find the independent effect of diabetes on healthcare cost [95].

All of the above approaches can be used in prevalence or an incidence based study. In the former case the costs of diabetes are estimated for a certain point in time, typically one year, while the latter approach estimates costs over a person's lifetime or several years, always starting with the point at which the disease is diagnosed. Both approaches may also be combined in studies estimating the future cost burden of type 2 diabetes by first taking a prevalence approach to calculate current costs and then using predictions about future diabetes incidence rates to arrive at an estimate of diabetes costs at a certain point in the future.