Short-acting Insulin Analogues: Systematic Review of Economic Literature

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BACKGROUND

Health expenditures associated with insulin have grown, along with the increasing number of patients with diabetes mellitus (DM) in Canada. Insulin therapy is recommended for all patients with type 1 DM and for some with type 2 DM. Compared to conventional insulin, short-acting insulin analogues have a shorter duration of effect (Figure 1) that is perceived as more convenient by patients; however, they are more expensive. With limited health care resources, decision makers need to know if funding short-acting insulin analogues is justified compared with already-funded conventional insulin.

OBJECTIVE

The aim was to examine the economic implications of short-acting insulin analogues for the treatment of diabetes mellitus through a systematic review of relevant literature.

METHOD

Published literature was obtained from cross-searching MEDLINE®, BIOSIS Preview®, PASCAL, Cochrane database, Health Economic Evaluations Database (HEED), and EMBASE® databases from 1990 onwards, with no language restrictions. Electronic alerts were established on these databases to capture new studies until January 1, 2006. Two reviewers independently selected eligible studies according to the selection criteria. Included studies were synthesized qualitatively and reporting quality was examined with a 35-item British Medical Journal (BMJ) checklist.

RESULTS

The selection flow is depicted in Figure 2. We identified five eligible studies, including two cost comparisons and three willingness-to-pay (WTP) studies. We judged the reporting quality of the five studies to be acceptable based on the BMJ checklist.

The two cost comparisons found no significant difference in total health care costs between compared insulin interventions. The higher price of insulin analogues was offset by lower hospitalization costs. Interpretation of the studies is limited by the propensity score method used, a short (12-month) time horizon and the lack of stratified analysis according to DM type or age.

The remaining studies showed that patients preferred the use of short-acting insulin instead of conventional insulin, and were willing to pay, in Canadian dollars, an extra C$52, C$55 and C$307 respectively in Canadian, Australian and UK health system settings. Regarding the net benefit of replacing conventional insulin with short-acting insulin, two studies reported that the incremental WTP significantly exceeded the incremental costs of short-acting insulin versus conventional insulin. Their sensitivity analyses demonstrated the robustness of the primary outcomes. Quantitative differences across studies are apparent and are likely due to multiple factors including characteristics of the study samples, the approach of conducting interviews for the WTP data, and the clinical benefit information the samples presented.

CONCLUSION

Available cost comparison studies suggest short-acting insulins will not increase overall health care costs in the short-term. However, their generalizability to a Canadian setting is questionable, and it is unclear that the cost savings in some health care settings – such as hospitalization – associated with the use of short-acting insulin analogues would be sustainable beyond one year. Although additional economic evidence suggests patients would be willing to pay more for short-acting insulin analogues, such results are not readily applicable to resource allocation decisions. Therefore, our review shows that a Canadian cost utility analysis with a longer time horizon is probably needed.

REFERENCES


Figure 1: Pharmacodynamic profiles of insulin analogues and conventional insulin

Figure 2: Flow chart for selection of economic studies

303 citations identified from electronic search (i.e., citations identified in the economic search minus citations already identified in the clinical search) and broad- screened
296 citations excluded
7 potentially relevant reports retrieved for further scrutiny
6 reports excluded: did not have relevant data (5), non-English (1)
4 relevant reports identified (2 from the clinical search and 2 from other sources)
5 studies identified for review