**Economic evaluation**

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**Question**

Are the incremental health effects worth the incremental costs, if a vaccine is both more effective and more expensive?

* The health benefit of the national infant immunisation programme is assessed by the expected reduction in the annual number of invasive pneumococcal disease in the Finnish population. The health benefit or effectiveness is measured in Quality-Adjusted Life Years (QALYs).
* The perspective of this analysis is that of the health care provider.

**Answer**

To find the most cost-effective vaccination programme according to the criteria described in the rationale.

⇤**#** : Code works but the costs seem unrealistic. **--**[**Jouni**](http://en.opasnet.org/w/User%3AJouni) **(**[**talk**](http://en.opasnet.org/w/User_talk%3AJouni)**) 05:49, 11 August 2014 (UTC)**

|  |  |
| --- | --- |
| Top of Form**Scenarios** Please choose the vaccines to be compared::PCV-10PCV-13What is the total price of the PCV10 vaccine?:What is the total price of the PCV13 vaccine?:Do you want to adjust PCV-10 or PCV-13 vaccine composition?:**User defined vaccine** Choose the serotypes for the PCV-10 vaccine composition:13456A6B6C7F89N9V10111214151618C19A19F202223A23F333538OtherChoose the serotypes for the PCV-10 vaccine composition:13456A6B6C7F89N9V10111214151618C19A19F202223A23F333538OtherBottom of Form |  |

**Rationale**

Vaccination programmes are ranked according to their effectiveness (V1 < V2 < V3, etc.). Effectiveness is measured as reduction in invasive pneumococcal disease. Vaccine programmes that are more expensive and less effective as compared with at least one other alternative (strongly dominated) are excluded. Incremental cost-effectiveness ratios (ICER) are calculated for the remaining vaccines:



where C is the price of the vaccination program,
S is the savings in health care costs and
E is the savings in QALYs.

Each vaccine (ranked according to their effectiveness) is compared with the next highest ranked vaccine. The least effective vaccine is compared with doing nothing. The most cost-effective vaccine is determined.

**Calculations**

An example involving two vaccine products will be presented on this page. The input required from the user includes (a) the serotype compositions of the two vaccines to be compared, and (b) the prices per dose for the two products. The computation utilises the epidemiological model to predict the incidence of invasive pneumococcal disease under each vaccination programmes. The output will produce the most cost-effective alternative.

|  |  |
| --- | --- |
| Top of FormBottom of Form[+ Show code- Hide code](http://en.opasnet.org/w/Economical_assessment) library(OpasnetUtils)#### Initiate ovariable ICER and function sumtableICER <- Ovariable("ICER",  dependencies = data.frame(Name = c( "qalysum",  "costsum" )), formula = function(...) { qalyorder <- oapply(QALY, INDEX = QALY@output["Vaccine"], FUN = sum) qalyorder <- as.character(qalyorder@output$Vaccine[order(result(qalyorder), decreasing = TRUE)]) qalysum2 <- qalysum costsum2 <- costsum # Take the Vaccine group from the previous group (based on reverse QALY order, i.e. worst first. levels(qalysum2@output$Vaccine) <- qalyorder[match(levels(qalysum2@output$Vaccine), qalyorder) + 1] levels(costsum2@output$Vaccine) <- qalyorder[match(levels(costsum2@output$Vaccine), qalyorder) + 1] # Remove NAs from the index or otherwise they will match anything. qalysum2@output <- qalysum2@output[!is.na(qalysum2@output$Vaccine) , ] costsum2@output <- costsum2@output[!is.na(costsum2@output$Vaccine) , ] out <- (costsum - costsum2) / (qalysum - qalysum2) return(out) })sumtable <- function() { out <- merge( merge( merge( qalysum@output,  costsum@output, by = "Vaccine" ), vacprice@output, all.x = TRUE ), ICER@output, all.x = TRUE ) out <- out[c("Vaccine", "Result.x", "Result.y", "vacpriceResult", "ICERResult")] colnames(out) <- c("Vaccine", "QALY", "Costs incl. price", "Vaccination price", "ICER") out <- out[ order(out$QALY, decreasing = TRUE) , ] return(out)}objects.store(ICER, sumtable)cat("Initiated ovariable ICER and function sumtable\n") |  |

**Data**

| [QALYs lost(per episode)](http://en.opasnet.org/w/Special%3AOpasnet_Base?id=op_en6358.qalys_lost) |
| --- |
| **Obs** | **Age** | **Result** |
| 1 | 1 | 10 |
| 2 | 2 | 9 |
| 3 | 3 | 9 |
| 4 | 4 | 8 |

| [Medical costs(euros per IPD episode)](http://en.opasnet.org/w/Special%3AOpasnet_Base?id=op_en6358.medical_costs) |
| --- |
| **Obs** | **Age** | **Result** |
| 1 | 1 | 1000 |
| 2 | 2 | 1000 |
| 3 | 3 | 500 |
| 4 | 4 | 400 |

**See also**

|  |
| --- |
| [**Tendering process for pneumococcal conjugate vaccine**](http://en.opasnet.org/w/Tendering_process_for_pneumococcal_conjugate_vaccine)  |
| Parts of the assessment  | [Comparison criteria for vaccine](http://en.opasnet.org/w/Comparison_criteria)   · [Epidemiological modelling](http://en.opasnet.org/w/Epidemiological_modelling)   · [Economic evaluation](http://en.opasnet.org/w/Economical_assessment)  |
| Background information  | [Replacement](http://en.opasnet.org/w/Replacement)   · [Pneumococcal vaccine products](http://en.opasnet.org/w/Pneumococcal_vaccine_products)   · [Finnish vaccination schedule](http://en.opasnet.org/w/Finnish_vaccination_schedule)   · [Selected recent publications](http://en.opasnet.org/w/References) Help for [discussion](http://en.opasnet.org/w/Discussion) and [wiki editing](http://en.opasnet.org/w/Help%3AQuick_reference_for_wiki_editing)  |
| Pages in Finnish  | [Pneumokokkirokotteen hankinta](http://fi.opasnet.org/fi/Pneumokokkirokotteen_hankinta_kansalliseen_rokotusohjelmaan)  · [Rokotteen vertailuperusteet](http://fi.opasnet.org/fi/Vertailuperusteet) · [Epidemiologinen malli](http://fi.opasnet.org/fi/Epidemiologinen_malli) · [Taloudellinen arviointi](http://fi.opasnet.org/fi/Taloudellinen_arviointi) · [Pneumokokkirokotteen turvallisuus](http://fi.opasnet.org/fi/Pneumokokkirokotteen_turvallisuus) [Work scheduling](http://fi.opasnet.org/fi/Keskustelu%3APneumokokkirokotteen_hankinta_kansalliseen_rokotusohjelmaan#Ty.C3.B6n_osat) · [Monitoring the effectiveness of the pneumococcal conjugate vaccine](http://fi.opasnet.org/fi/Pneumokokkikonjugaattirokotteen_vaikuttavuuden_seuranta) · [Glossary of vaccine terminology](http://fi.opasnet.org/fi/Rokotesanasto)  |

**References**

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Current comments that have not yet been included in the main page or talk page.