**Table 3. Principles of good practice of modelling and guidelines for critical appraisal of models.**

| *Subject of assessment* | *Principles of good practice* | *Questions for critical appraisal* |
|---|---|---|
| **Model structure** | | |
| States of health | Structure of the model should be as simple as possible and, at the same time, it has to correspond to the decision-related problem and compliant to generally accepted knowledge on the course of the modelled disease, as well as cause-effect relation between the variables.<br>Lack of data does not justify elimination of states or simplification of the model. | Are the decision-related problem, the context and the perspective clearly defined?<br>Are important details of the course of the modelled disease described?<br>Are the model assumptions described and justified?<br>Is the selection of the model states justified? If so, is it compliant to the knowledge on the disease?<br>Are any important health states missing? |
| Comparators | The model should take into account comparators defined in these guidelines, especially those used in real-life practice. | Were comparators identified?<br>Do they cover all the scope of options justified and possible to be made in the model? |
| Time horizon | Time horizon of the model should be sufficient to show durable differences in costs and results of the compared strategies. | Was the time horizon of the trial defined? If so, is it appropriate to the analyzed situation? |
| Cycle length (if Markov model is applied) | A cycle should be the shortest time span in which changes of examined parameters are expected; it should correspond to characteristics of the disease process. | Was the length of cycles defined in the model?<br>Was the cycle length justified? If so, does it correspond to the disease process? |
| **Input data for the model** | | |
| Identification of input data | The model should take advantage of the best data available. A systematic review of the relevant literature should be carried out to obtain the crucial input data for the model. Proof of such review or a justification of its absence should be presented. If experts' opinions are the source of input data, the methods of obtaining the data should be described. | Are the data sources presented in the model?<br>Have the proper methods of data source searching been implemented?<br>Has the range of parameter variability been determined?<br>Are there premises, suggesting the data have been used selectively?<br>Is the manner of obtaining data provided (e.g. criteria for selecting experts, their number, the method of obtaining information) if values of certain parameters have been assessed on the basis of experts' opinions? |
| Data modelling | Data modelling should be carried out on the basis of generally accepted biostatistical and epidemiological methods. | Have the methods used for data modelling been described? Have the generally accepted criteria of biostatistical and epidemiological methods been complied with? |

| *Subject of assessment* | *Principles of good practice* | *Questions for critical appraisal* |
|---|---|---|
| Inclusion of data into the model | Measurement units, time intervals and population characteristics must be mutually compatible in the entire model. Both deterministic and probabilistic simulations are acceptable.<br>The half-cycle correction should be implemented to adjust time-dependent assessment. | Are the measurement units, time intervals and population characteristics mutually compatible in the model?<br>Has the half-cycle correction been implemented? |
| **Sensitivity analysis** | | |
| Sensitivity analysis | Each model must include the sensitivity analysis of the crucial parameters and a justification of the analyzed range of parameter variability. | Have sensitivity analyses been carried out for all crucial parameters? Has the scope of variability of the parameters tested in sensitivity analysis been justified? |
| **Model validation** | | |
| Internal validation | In order to identify errors related to data introduction and the model structure, the model should be tested systematically; for instance, it should be checked, whether expected results are obtained in the case zero or extreme input values are used; the code of the software should be analysed to identify syntactic errors or repeatability of results should be tested by means of equivalent input values. If there are external sources of input and output data (independent of those used in the model), the model should be calibrated. | Has a report on internal validation been provided? |
| Convergence validation | The model should be compared to other models focused on the same problem; in case of varying results, the reasons for such differences should be identified. | Have any other models of the same problem been identified? If so, have the results of different been compared, and in case of varying results, have the reasons for such differences been identified? |
| External validation | External validation focuses on compatibility of modelling results with direct empirical evidence. It can consist, for instance, in comparing indirect output data of a model with published results of long-term research (if there are any). | Has any research been identified, the results of which could be compared to the model results? Have the results been compared? Have any differences been identified and their reasons explained? |

## 4.6. Health effects assessment --

Economic analysis is aimed at assessing the actual consequences of the implementation of a given technology real daily clinical practice. Measurements should focus on effectiveness (i.e. the results obtained in real conditions) rather than efficacy (the results obtained in controlled clinical trials). Data for effectiveness analysis and for efficacy analysis should be presented and assessed separately. It is infrequent to obtain in daily practice such results which can be obtained in the optimized conditions of a clinical trial (clinical experiment). Thus, the results of effectiveness obtained from observational studies are better than experimental results assessed in a systematic review, which should be treated with utmost care. Arguments confirming their reliability should be provided in the case they are used for economic analysis. --

Sometimes, especially in the case of new technologies, the data on its efficacy are the only data available. Apart from the standard analysis based on efficacy, modelling and sensitivity analysis should be carried out to extrapolate the data onto the conditions of actual practice and to examine the impact of various interrelations between effectiveness and efficacy on the final conclusions of an analysis. It should also be emphasised that effectiveness is in the great majority of cases lower than efficacy – the adoption of different assumptions in the modelling requires a solid scientific basis or must result from a consistent logical reasoning. --

## 4.7. Cost assessment --

The economic analysis of medical technologies should comprise only the costs corresponding to consumable resources used during the application of a given technology in daily clinical practice. The perspective and time horizon of cost examination must be identical to the time horizon and the perspective of assessing clinical results. The choice of a perspective and a time horizon are strictly correlated to the following stages, where the categories of examined costs are identified and the method of their measurement and assessment is defined. --

### 4.7.1. Cost categories --

The analysis should differentiate the following: --

1. direct medical costs, --
2. direct non-medical costs, --
3. indirect costs. --

All the above-listed cost categories are accounted for in the case of the social perspective. The results accounting for the direct and indirect costs and the results accounting exclusively for the costs incurred by the public payer in the health care system should be presented separately.

### 4.7.2. Identification of used resources

Identification of used resources involves the need to determine, which resources are appropriate for an examined problem (illness, intervention). It is recommended first to describe a given technology in detail, to identify the resources to be accounted for in the analysis. Then it is proposed to decide which elements should be measured and assessed separately. Sensitivity analysis should be carried out, in order to identify the resources with the highest impact on the total and incremental cost. The sensitivity analysis is also used to identify the costs, which should be measured and assessed separately in detail (by the micro-costing method[40], and the costs, which can be sufficiently analysed by the gross-costing method[41]. --

[40] The micro-costing method is based on detailed data on all resources used in a given intervention and is often associated with the collection of original data.

[41] The gross-costing method is based on the more aggregated data about the used resources. The characteristics of gross-costing include: simplicity, practicality and (intended) resistance to details specific for site or patient characteristics.

### 4.7.3.Measurement of used resources --

Used resources can be measured in two ways: either by collecting primary data within a properly designed research, or by collecting secondary data from existing databases.

The choice of data sources depends on the required degree of detail to be analysed. The choice should be based on the following criteria: --

- research perspective, --
- share of a given component in the total or incremental cost, --
- data availability, --
- equilibrium between internal and external reliability. --

High accuracy is the advantage of the primary data, while their disadvantage consists in the fact, that their collection is time-consuming and labour-intensive. Another disadvantage is the fact that the data collected within the framework of a clinical trial also contain information on resources, the use of which is induced by the trial protocol. Secondary data, e.g. from national registers, are characterized by a generally high external reliability. However, they may turn out to be incomplete, as such databases do not cover all types of resources. --

Both the micro-costing method and the gross-costing method, differing in the precision of used resources assessment, can be used to measure used resources. Both methods can also be used in a single analysis. The higher the impact of a given cost component on the total or incremental cost, the higher should be the precision of its assessment. Thus, the micro-costing method is better suited to the interventions and events occurring at the present moment. The method of gross-costing is acceptable, when the implementation of the more accurate microcosting method shall have no significant impact on the analysis results. Precision is usually of less importance in the calculations of costs to be incurred in the future. --

### 4.7.4.Determination of unit costs --

Unit costs used in the analysis must be determined in accordance with the research perspective. The following methods of assessing the monetary value of used resources can be implemented: --

- use the list of standard costs, --
- use the formerly published research, --
- use local scales of charges, --
- direct calculation. --

The choice of the monetary method of assessing units of used resources should be conditioned by the choice of the method of measuring the used resources[42]. --

When using a list of standard costs (if it was published) for units of used resources with considerable share in the total or incremental cost, it may be indispensable to use more precise methods, e.g. the direct calculation of a unit cost. --

It is particularly recommended to use local scales of charges, when an examined intervention is available only in a health care institution of a certain type. The list of charges covers a large

[42] For example, there is no sense to perform monetary evaluation of the used resources by direct calculation if national registers were used for the measurement of the used resources.

number of procedures and services; the data are available to researchers without additional amount of labour or costs. Oftentimes, it is the best method and the only one available, but the charges not always correspond to actual costs. The use of charges is a method of choice in the case of profitability analyses carried out from the perspective of a public payer. In other cases, the analyst should determine the relation between charges and the actual costs of examined interventions. --

The direct calculation of unit costs is the most labour-intensive method. It is used in the assessment of units of resources, which have special impact on the total or incremental cost, and in the cases, when no data from other sources are available. --

When deciding to carry out the direct calculation, the researcher should select: --

- a specific environment, --
- a calculation method (either "top-to-bottom" or "bottom-to-top"), --
- a method of cost allocation (e.g. costs from other hospital wards, buildings, the cost of general purpose equipment and fixed costs). --

As unit costs may vary with different service providers, the cost calculation is highly influenced by the choice of a centre. It is recommended to collect data on unit costs from a sufficient number of centres which provide a given type of services with varying level of referentiality (or from all the centres that provide a given type of service). A sensitivity analyses should also be performed based on the identified cost differences. Cost presentation should include both the central tendency measure and the measure of scatter for total results and for particular reference levels. --

When calculating unit costs by the "top-to-bottom" method, the financial and administrative data of a service provider are used as the primary data. The method can be implemented in the case when services of a given ward are characterized by a high degree of uniformity. Then, it can take advantage of the data obtained directly from the financial department, concerning the cost of personnel, medical materials and the annual number of man-days at a given ward, in order to calculate the cost of a single man-day. The "bottom-to-top" method is more suitable if the services at a given ward are heterogeneous. In this case, the unit cost of a service is determined on the basis of the measurement of the actual consumption of materials and equipment, and of the work time needed for the personnel to provide a given procedure to a single patient. The disadvantage of the "bottom-to-top" method consists in the fact that it is time-consuming and a researcher is not always able to carry out direct and detailed measurements. In practice, a combination of both methods is implemented. --

The allocation of costs from other hospital wards, buildings and the cost of general purpose equipment and fixed costs should be realized by the direct allocation method[43]. --

It is recommended to use standard values for the calculation of certain unit costs[44]. Their use may reduce the differences in the assessment of these costs. --

The loss of productivity caused by illness or premature death is recommended to be assessed by means of the human capital method (e.g. on the basis of average wages)[45]. --

[43] The method consists in identifying the wards providing direct services to patients (such as a surgery ward) and auxiliary wards (such as the kitchen, the financial ward), in ascribing the costs of auxiliary wards first to the wards providing direct services, and then in allocating costs between the products of these wards.

[44] Examples of standard values: the number of work days per year and the average annual wages, the annual number of work hours of persons employed in this health care sector and their annual wages, the average distance from the hospital (used to calculate the cost of transport), the rate of discount, the inflation rate.

## 4.8. Discounting

The assumed rate of discount is equal to: --

- 5% for costs and 3.5% for health care results – in the basic analysis; --
- 5% for costs and health care results, 0% for costs and health care results, 0% for health care results and 5% for costs – in sensitivity analyses. --

## 4.9. Data presentation --

All data should be presented with scatter measures, in a clear manner, in table form, and identified by the data source. The input variable distribution should be defined and justified in probabilistic analyses. The methods of data collection and analysis should be described and justified. The forms used to collect data should be attached as annexes to the report. --

## 4.10. Presentation of results --

The results of the economic analysis should be presented in the following form: --

- total clinical results and, separately, total costs of compared technologies, --
- incremental cost-effectiveness ratio (in the case of domination or extended domination). --

The presentation method should be clear enough to ensure proper interpretation of the analysis and the possibility of data recovery and utilization in the future. --

The results of the analysis of particular population sub-groups should also be presented if such analysis has been carried out. It should indicate whether and how much can the examined technology be more cost-effective in the sub-groups than in the entire analyzed population. --

## 4.11. Sensitivity analysis and result uncertainty assessment --

The sensitivity analysis — tackling the problem of uncertainty of the results of clinical and economic assessments — is an indispensable element of the presentation of economic analysis results. Result uncertainty is due to absence of certain data, insufficient precision in value assessment, and to methodology-related controversies. The sensitivity analysis allows to tackle the problem of generalizing analysis results, i.e. it examines whether and to what extent the results based on measurements in a given sample population of patients and/or in a specific context are true for the entire population and/or in other contexts. --

The sensitivity analysis should address first of all those input data for which the scatter measures and estimation uncertainty are the highest. --

The sensitivity analysis is indispensable due to the uncertainty of the results of the economic analysis. The simple sensitivity analysis assesses the impact of a change in the value of one

[45] According to www.aodgp.gov.au/internet/wcms/publishing.nsf/Content/health-pbs-general-pubs-pharmpac-glossary-glossh.htm.

variable[46] or several variables[47] on the final conclusion. The threshold analysis requires the critical variable values, leading to a change in the final conclusion, to be calculated. The extreme values analysis assesses the impact of the situation, when one or several variables assume minimum or maximum values (the analysis of the most pessimistic or the most optimistic scenarios). The probabilistic sensitivity analysis accounts for the probability of the appearance of particular values from the scope of variability of a given parameter. --

It is necessary to carry out at least a simple one-way and multi-way sensitivity analysis. --

The sensitivity analysis should: --

- identify uncertain parameters (subject to assessment error), --
- define the scope of variability of uncertain parameters, --
- calculate the analysis results, assuming a determined variability of uncertain parameters. --

The scope of parameter variability should be determined on the basis of a review of publications, experts' opinions or on the basis of confidence intervals around the average value. One can also assume a probable scope of parameter variability. The variable distribution implemented in the assessment of uncertainty of input parameters should be defined and justified in probabilistic analyses. --

It is recommended to present sensitivity analysis results in table and graphical form. --

### 4.11.1. Result uncertainty assessment --

The uncertainty of the incremental coefficient for cost-effectiveness or cost-utility should be estimated using the appropriate statistical methods. --
A probabilistic analysis can be performed using the analytical methods or using the Monte Carlo method. The distribution of variables which are the model parameters should be defined and justified. If the effect of some uncertainty parameters on the result is ignored, it should be justified. --
The distribution of the possible results of the model, which is the result of the probabilistic analysis, should be presented graphically in the cost-effectiveness, cost-utility coordinate system. Based on this distribution, if possible, the mean and confidence intervals ICER (e.g. 95%) should be determined or it should be presented in another way, e.g. using an acceptability curve or incremental *Net Monetary Benefit* (NMB)[48]. --
The selection of methods should be described and justified, and their assumptions should be tested[49]. --

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[46] One-way sensitivity analysis.

[47] Multi-way sensitivity analysis.

[48] Net Monetary Benefit (NMB) is an additional effect obtained owing to the use of the new therapy, expressed in monetary units, minus the additional cost associated with the new therapy.

(1) Stinnett AA, Mullahy J (1998) Net health benefits: a new framework for the analysis of uncertainty in cost-effectiveness analysis. Med Decis Making 18:S68–S80

[49] (1) O'Brien BJ. Briggs AH , 2002], Analysis of uncertainty in health care cost-effectiveness studies: An introduction to statistical issues and methods. Statistical Methods in Medical Research. Vol 11(6) (pp 455-468).
(2) Briggs AH, Mooney CZ, Wonderling DE. 1999, Constructing confidence intervals for cost effectiveness ratios: an evaluation of parametric and non-parametric techniques using Monte Carlo simulation. Statistics in Medicine; 18:3245-62.

It is recommended to present the results of the uncertainty analysis in the form of appropriate charts and diagrams.

## 4.11.2. Areas of possible divergences between the clinical and the economic parts --

### 4.11.3. Health outcome presentation method --

Sometimes, in the studies included in the clinical part based on the predefined inclusion criteria, no solid endpoints (e.g. cerebral stroke risk) are assessed but e.g. blood pressure reduction. In these cases, in the economic part it is recommended – taking into account that the analyses should refer to the measures common for all medical technologies such as the quality of life or survival – to convert the data regarding the surrogates to the probabilities of clinically significant endpoints (provided a reliable conversion method exists). --

The studies concerning efficacy have the highest internal reliability. Therefore, these reports are usually included in the systematic review. It should be emphasised that actual efficacy is in most cases lower than experimental efficacy. The adoption of different assumptions in the economic analysis requires a rationale based on scientific evidence of consistent logical reasoning. In the case of the economic part of the report, a significant importance is attributed to the practical effectiveness studies (post-marketing studies, phase IV, patient registers). Therefore, to minimise the divergences between the analyses, it is recommended to perform a systematic review also for these studies in the clinical part. However, attention should be paid to keep the review of studies of the highest reliability as the crucial part of the analysis. -

### 4.11.4. Data presentation in time --

It happens that in the studies included in the clinical part based on the predefined inclusion criteria the observation period is short (which is often the case for the studies of the highest internal reliability), and extrapolation from a short horizon of clinical trials is unreliable or may be associated with a significant error. In these cases, it is justified to perform an additional systematic review of observational studies with a longer time horizon in the clinical part of the report, and in the economic part, a discussion should be included regarding the limitations associated with the use of the two methods, with a rationale for selecting one of them. --

### 4.11.5. Scope of data used for result presentation --

If the economic analysis consists in the adaptation of an existing model, it should be noted that the data on which the model is based may be unavailable in the systematic review. To ensure the possibly highest reliability, it is therefore recommended to perform a systematic data search for the crucial parameters of the model. --

## 4.12. Limitations and discussion --

The limitations and discussion should be clearly separated. --

### 4.12.1.Limitations

In the part concerning limitations, all characteristics of the analysis and the available initial data, as well as the scope of analysis in the context of the specific decision problem, should be discussed. All phenomena that significantly affect the degree of uncertainty of the obtained results and the conclusions should be described. --

### 4.12.2.Discussion

The discussion is a critical description of the obtained results and conclusions in the context of a decision problem specified before the analysis and presented in the report. The discussion involves a polemic with the arguments of the possible critique of the obtained results and conclusions drawn. It is advisable to discuss the available data, applied methods and obtained results. Results of other analyses of the same problem should also be presented and used as a background for discussing the obtained results, justifying possible differences. --

## 4.13. Final conclusions and summary --

The basic conclusions drawn from the clinical effectiveness analysis should be synthesized.

The results with the possible interpretations and the conclusions should be clearly separated. The conclusions should only refer to the purpose of analysis and they should be directly related to the obtained results. In the economic analysis, the results should refer to the profitability limits and the significance of differences in the profitability of the compared options.--

# 5. Analysis of impact on health care system --

The analysis of the impact of a decision to finance the examined medical technology or not assesses all the principal, possible and probable consequences of the decision for the health care system in Poland. --

The analysis of impact on the health care system covers the budget impact analysis and the assessment of organizational consequences for the heath care system, and possibly the assessment of possible ethical and social implications. --

## 5.1. Budget impact analysis --

The budget impact analysis determines the financial consequences of the introduction of the assessed health technology in the Polish health care system. --

If there are no precise data for Poland, the most important input data should undergo multidimensional assessment. --

### 5.1.1. Population --

In the budget impact analysis, the examined population is constituted by all patients, who can be subjected to a procedure realized by means of a given medical technology. The examined population is defined on the basis of the indications registered for a given technology. Local restrictions concerning the possibility of implementing a medical technology outside the scope of registered indications should be respected, and the induced demand (e.g. a certain percentage of patients, hitherto "untreated", shall use the technology, as it is more efficient and characterized by a better safety profile), as well as the degree of implementation of the new technology in the reviewed time and the change in the degree of usage of the hitherto implemented methods, should be considered. In contrast to the clinical efficacy and effectiveness and the economic analysis, where the examined population is closed (a cohort of patients is defined at the start and all the included patients remain in the examined population within a given time horizon), the population examined in the budget impact analysis is open. It means that particular patients enter or leave the population, when they meet or fail to meet the defined inclusion criteria at a given moment. In some cases, when the technology applies to a well-defined group of patients, the budget impact analysis may require using a closed population. --

The patient population should be assessed by the following sequence of operations (if applicable to a given technology): --

- identify the prevalence of a given condition, --
- assess the number of persons, who would be advised to take advantage of the technology, --
- assess the market position of the technology, as advised on the basis of particular indications, and do so on the basis of the estimation of: --
    - the population percentage expected to use the technology in question, compared to the part of the population, which shall use alternative technologies for a given indication, --

- the expected abandonment of currently used technologies in favour of the examined new technology and the scope of implementation of the current technologies and of the new one. --

The technology impact should be assessed through the construction of alternative scenarios: the most probable, the optimistic and the pessimistic one. The scenarios should be constructed on the basis of the factors that can have the greatest impact on technology implementation and of various assessment of the condition prevalence. The dissemination of the new technology, the replacement of current technologies with the new one and the expected degree of new technology over-implementation should be considered. The impact of the legal regulations in force should also be taken into account[50]. --

### 5.1.2.Perspective --

The budget impact analysis should be carried out from the perspective of a public payer, who finances health care services. --

### 5.1.3.Time horizon --

The budget impact analysis involves an assessment of impact of a given medical technology on the annual health care budget during the next years after the introduction of the new technology. Usually the time period sufficient for the market to reach the state of equilibrium is used, or at least 2 years since the date when a given medical technology was started to be financed from public means. --

### 5.1.4.Compared scenarios --

The budget impact analysis compares scenarios defined rather by a set of interventions than by specific interventions. The "existing scenario" and a "new scenario" are taken into consideration. The "existing scenario" is a set of interventions, currently used in a given population. The "new scenario" is a scenario of expected developments after the introduction of the new technology which may be added to the existing ones, or else it may replace all or some of them. The analysis should describe and justify the assumptions concerning the "existing scenario" and the expected changes, related to the accessibility of the new medical technology. --

### 5.1.5.Parameters taken into consideration --

The parameters for the budget impact assessment comprise: --

1. the size and characteristics of the examined population, --
2. the scenario presenting the "existing practice", --
3. the scenario of expected developments after the introduction of the new technology (the "new scenario"), --
4. the costs of the above-mentioned scenarios. --

[50] Such as the regulations concerning reimbursement of therapeutic products.

The type of relevant data varies, depending on the considered parameters. Data sources are highly differentiated and cover: published and unpublished epidemiological research, national statistical data, market research, registers, various databases, experts' opinions. The following aspects should be presented: advantages and disadvantages of the above-mentioned data sources, criteria for the selection of data sources, methods of collecting and analysing primary data. --

### 5.1.6. Budget outlays and receipts --

Budget outlays should be assessed in a manner, which ensures their correspondence to actual payments and actual savings achieved by a public payer. --

The budget impact analysis should focus especially on determining, whether the calculated savings are going to be noticeable in the actual practice. It is desirable to present in quantitative terms the impact of the technology on medical services, as this can have practical implications for planning the organization of the health care system. --

Depending on the type of the new intervention, it may be important to describe the conditions of its introduction, such as the need to train the personnel, to prepare new clinical guidelines or to change the diagnostic principles, and to describe the related costs in a specific time period. --

The actually implemented medical technologies should be identified. --

A separate assessment for particular types of outlays should be prepared[51]. --

Based on the determination of both the effect on the population and the results of cost-effectiveness analysis, the incremental net changes in public expenditures as regards health care as a result of the decision concerning the appraised technology should be estimated. --

The estimation of the total incremental change in the outlays should comprise: --

- the outlays related to the new technology, --
- the cost of additional outlays in the health care system, related to the implementation of the new technology, --
- the reduction of outlays related to the reduced use of the current technologies, in case the new technology takes over, --
- the reduction of costs related to the savings in the domain of other services (e.g. reduction of the number of inpatients), --
- the analysis of the possibility of actual reduction of outlays in the domains of expected savings. --

### 5.1.7. Discounting

By principle, the budget impact analysis does not discount costs, as the analysis presents the flow of financial means in time. --

[51] E.g. drug reimbursement, hospital treatment expenditures, specialist outpatient care expenditures.

### 5.1.8. Presentation of results --

For each year within the examined time horizon, both the total and incremental impact on the budget should be presented. Consumption of resources and outlays should be presented in separate tables to show the changes in particular years within the time horizon. The impact on health care results in particular years can be presented in an analogous manner. --

## 5.2. Impact on the organisation providing health care services --

If a positive decision about the appraised technology could cause significant consequences for public expenditures in sectors other than health care, then such effect should be analysed separately. In particular, it refers to expenses for sickness benefits and pensions, as well as other expenses incurred as part of the public social insurance. Depending on the type of the new intervention, it may be important to describe the conditions of its introduction, such as the need to train the personnel, to prepare new clinical guidelines or to change the diagnostic principles, and to describe the related costs. --

Sometimes the quality of results obtained by means of the technology in question depends on the experience and skill of the providers and the centre. In this case, particular emphasis should be placed on the need to ensure high quality of services by the health care organizers. -

## 5.3. Ethical and social aspects --

It should also be considered, whether the positive decision concerning the technology in question shall have an impact on the costs or results concerning other persons, than those taking advantage of the technology (external impact). --

The following issues should be taken into consideration: --

- which groups of patients, if any, may be favoured as a result of the adopted assumptions of economic analysis, --
- is the access to the medical technology guaranteed to be equal, when the needs are equal, --
- is a narrow group of persons expected to receive a big benefit, a small benefit, or is the benefit to be of general character, --
- does the technology constitute a response to the hitherto unfulfilled needs of the group of the socially handicapped, --
- does the technology constitute a response the group of persons with the highest health care needs, who are not offered any available treatment method at the moment. --

It should be considered, whether a positive decision concerning the assessed technology can lead to social problems, including: --

- an impact on the level of patient satisfaction with the received medical care, --
- a threat of rejection of the procedure by particular patients, --
- can it result in or change patient stigmatization, --
- can it lead to anxiety, --

- can it lead to moral dilemmas, --
- possible sex- or family-related problems. --

It should also be analysed, whether the decision concerning the technology in question: --

- is in contradiction with the legal regulation currently in force, --
- results in a need to introduce changes into the law/regulations, --
- has an impact on the rights of a patient or on human rights. --

It should be determined, whether the procedure of technology implementation imposes special requirements, such as: --

- the need to inform a patient in detail or to obtain his/her consent, --
- the need to provide a patient with convenient environment, --
- the need to allow for individual preferences, the need for a patient to participate actively in making a decision on the method of treatment. --

Summing up the social and ethical impact, as well as the organizational impact, one may prepare a SWOT analysis of financing the technology in question from public means, as compared to the existing circumstances[52]. In this section, it is also advisable to identify potential followers and opponents of the relevant decision, while assessing the expected degree of their involvement in supporting or criticising the decision. --

## 5.4. Final conclusions and summary --

The basic conclusions drawn from the analysis of impact on the health care system should be synthesized. The report should contain a summary presenting the analysis of impact on the health care system. --

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Repertory no. 106 / 2009
I, Jolanta Szadkowska, sworn translator of English at the Ministry of Justice in Poland, entered onto the List of Sworn Translators under no. TP/1713/05, hereby confirm the accordance of the above translation with the original drafted in Polish.

Piaseczno, 17th June 2009

[52] Strengths- Weaknesses-Opportunities-Threats – a type of strategic analysis based on identification of strengths and weaknesses of a given procedure as well as the related opportunities and threats.

Adam Maciejewski
Sworn translator of the English language

# Translation from the Polish language

Dz.U.12.388 → *of 11 April 2012*

**REGULATION**
**OF THE MINISTER OF HEALTH**
of 2 April 2012
**on the minimum requirements to be satisfied by the analyses accounted for in the applications for reimbursement and setting the official sales price and for increasing the official sales price of a drug, a special purpose dietary supplement, a medical device, which do not have a reimbursed counterpart in a given indication**

Pursuant to Article 24 par. 7 item 2 of the Act of 12 May 2011 on the reimbursement of medicinal products, special purpose dietary supplements and medical devices (Dz. U. No. 122, item 696 and of 2012 item 95) it is hereby ordered as follows:

§ 1.

The Regulation specifies the minimum requirements to be satisfied by the clinical analysis, economic analysis, the analysis of the impact on the budget of the entity responsible for financing benefits with public funds, and rationalisation analysis referred to in Article 25 par. 14 item c and Article 26 par. 2 items h–j of the Act of 12 May 2011 on the reimbursement of medicinal products, special purpose dietary supplements and medical devices (Dz. U. No. 122, item 696 and of 2012 item 95), hereinafter referred to as the "Act", included:

1) in the justification of the application for reimbursement and setting the official sales price of a drug, a special purpose dietary supplement, a medical device, which do not have a reimbursed counterpart in a given indication;
2) in the application for increasing the official sales price of a drug, a special purpose dietary supplement, a medical device, which do not have a reimbursed counterpart in a given indication.

§ 2.

The information contained in the analyses shall be up-to-date as at the date of submitting the application at least with respect to effectiveness, safety, prices as well as level and method of financing of the technology for which the application was filed and optional technologies.

§ 3.

The terms used in the Regulation shall have the following meanings:

1) primary trial – a trial providing original data obtained based on the measurements made in the group of persons subject to the trial;
2) secondary trial – an analysis of the data derived from primary trials;
3) time horizon relevant for the economic analysis – a time perspective in which the health effects and expenditures related to using the technologies compared in the economic analysis are estimated, which enables the reflection of all relevant differences with respect to health effects and costs between the compared technologies in the analyses;
4) time horizon relevant for the analysis of the impact on the budget – a time perspective in which the expenditures of the entity responsible for financing benefits with public funds related to the use of the technology for which the application was filed are estimated, which comprises the forecast time interval sufficient to determine the market equilibrium and lasting at least 2 years from making the amendment arising from the competent minister's issuing the reimbursement decision referred to in Article 11 par. 1 of the Act or the price increase decision referred to in Article 11 par. 4 of the Act;
5) comparison – presenting the trials the object of which is proving or describing the differences between the technology for which the application was filed and the optional technology, and should there be no such trials – presenting separate trials referring to the technology for which the application was filed and optional technology or the natural course of the disease;
6) systematic review – a secondary trial conducted based on a set of consistently employed transparent predefined trial selection criteria in accordance with a described pattern enabling repetition, accounting for the reliability assessment of the selected trials and comprising a systematic objective review of the results of the selected trials;
7) reimbursed optional technology – an optional technology financed with public funds in the Republic of Poland consistently with the facts on the day of filing the application;
8) technology – a health technology as defined in Article 5 par. 42a of the Act of 27 August 2004 on health care benefits financed with public funds (Dz. U. of 2008 No. 164, item 1027, as amended) or a special purpose dietary supplement or a medical device as defined in Article 2 par. 21 and 28 of the Act;
9) optional technology – a medical procedure as defined in Article 5 par. 42 of the Act of 27 August 2004 on health care benefits financed with public funds applicable in a given clinical condition in the indication for which the

application was filed, which is available in the Republic of Poland, consistently with the facts on the day of filing the application;

10) application – the application referred to in Article 24 par. 1 item 1 or 2 of the Act.

§ 4.

1. The clinical analysis referred to in Article 25 par. 14 item c first indent and Article 26 par. 2 item h of the Act shall include:

1) a description of a health problem accounting for the overview of the epidemiological indicators available in the scientific literature, including incidence rates and prevalence of the clinical condition specified in the application, in particular referring to the Polish population;

2) a description of optional technologies with the reimbursed optional technologies listed and the method and the level of their financing specified;

3) a systematic review of primary trials;

4) selection criteria for the primary trials to be reviewed as stipulated in subpar. 3 with respect to:

   a) characteristics of the population in which the trials were conducted,

   b) characteristics of the technologies used for the trials,

   c) effectiveness and safety parameters constituting the object of the trials,

   d) methodology of the trials;

5) indication of the published systematic reviews satisfying the criteria referred to in subpar. 4 items a and b.

2. The review referred to in par. 1 subpar. 3 shall satisfy the following criteria:

1) consistency of the criterion referred to in par. 1 subpar. 4 item a with the target population indicated in the application;

2) consistency of the criterion referred to in par. 1 subpar. 4 item b with the characteristics of the technology for which the application was filed.

3. The review referred to in par. 1 subpar. 3 shall include:

1) a comparison with at least one reimbursed optional technology, and should there be no reimbursed optional technology – with another optional technology;

2) an indentification of all trials satisfying the criteria referred to in par. 1 subpar. 4;

3) a description of the queries performed in bibliographic databases;

4) a description of the trial selection process, in particular the number of publications excluded at the subsequent selection stages and the causes of the exclusion at the full text seletion stage – in the form of a diagram;

5) characteristics of every trial included in the review in a tabular form, with the account for the following:

   a) a description of the methodology of the trial, including the indication whether a given trial was designed in the methodology enabling:

      - proving the superiority of the technology for which the application was filed over the optional technology,

      - proving the equivalence of technology for which the application was filed and the optional technology,

      - proving the non-inferiority of the technology for which the application was filed and the optional technology,

   b) criteria of selecting participants in the trial,

   c) a description of the procedure of allocating participants to technologies,

   d) characteristics of the group of participants,

   e) characteristics of the procedures to which participants were subject,

   f) a list of all parameters subject to assessment in the trial,

   g) information on the percentage of the persons who stopped participating in the trial prior to its completion,

   h) indication of the sources of financing the trial;

6) a specification of the results obtained in each of the trials to the extent compliant with the criteria referred to in par. 1 subpar. 4 item c in a tabular form;

7) information on safety addressed to persons performing medical professions, which is up-to-date on the day of filing the application and that come in particular from the following sources: websites of the Office for Registration of Medicinal Products, Medical Devices and Biocidal Products, the European Medicines Agency and the U.S. Food and Drug Administration.

4. Should there be no optional technology, the clinical analysis shall include a comparison with the natural course of the disease, in accordance with a given clinical condition in the indication for which the application was filed.

§ 5.

1. The economic analysis referred to in Article 25 par. 14 item c second indent and Article 26 par. 2 item h of the Act shall include:

1) a basic analysis;

2) a sensitivity analysis;

3) a systematic review of the published economic analyses, where health costs and health effects of the technology for which the application was filed were compared with the costs and effects of the optional technology in the population indicated in the application, and if the analyses for the population indicated in the application were not published – in a broader population than the one indicated in the application.

2. The basic analysis shall include:

1) a specification of the estimates of the costs and health effects of the technology for which the application was filed and the compared optional technologies in the population indicated in the application, with the specification of the following:

   a) estimating the costs of using each of the technologies,

   b) estimating the health effects of each of the technologies;

2) the estimation of the cost of gaining an additional quality adjusted life year , arising from replacing optional technologies, including reimbursed optional technologies, with the technology for which the application was filed;

3) the estimation of the cost of gaining an additional life year arising from replacing optional technologies, including reimbursed optional technologies, with the technology for which the application was filed – should it be impossible to determine the cost referred to in subpar. 2;

4) the estimation of the net sales price of the technology for which the application was filed, at which the cost referred to in subpar. 2, and should it be impossible to determine this cost – the cost referred to in subpar. 3, is equal to the threshold referred to in Article 12 par. 13 of the Act;

5) tabular specification of the values based on which the estimations referred to in subpar. 1-4 and par. 6 subpar. 1 and 2 and the calculation referred to in par. 6 subpar. 3 were made;

6) the specification of the assumptions based on which the estimations referred to in subpar. 1-4 and par. 6 subpar. 1 and 2 and the calculation referred to in par. 6 subpar. 3 were made;

7) an electronic document enabling the repetition of all calculations and estimations referred to in subpar. 1–4 and par. 6 as well as performing calculations and estimations upon the modification of any of the entered values and any of the correlations between these values, in particular the price of the technology for which the application was filed.

3. Should there be no differences in health effects between the technology for which the application was filed and the optional technology, it shall be permissible to present the estimated difference between the cost of the technology for which the application was filed and the cost of the optional technology instead of the estimations referred to in par. 2 subpar. 2 and 3.

4. In the case of the circumstances referred to in par. 3, it shall be permissible to present the estimation of the net sales price of the technology for which the application was filed, at which the difference referred to in par. 3 is zero instead of presenting the estimation referred to in par. 2 subpar. 4.

5. Should the conditions for inclusion in the reimbursement comprise the risk-sharing instruments referred to in Article 11 par. 5 of the Act, the estimations and calculations referred to in par. 2 subpar. 1 item a, subpar. 2–4 and par. 6, shall be presented in the following variants:

1) with the account for the proposed risk-sharing instrument;

2) without the account for the proposed risk-sharing instrument.

6. In the case of the circumstances referred to in Article 13 par. 3 of the Act, the economic analysis shall include:

1) the estimation of the ratio of the cost of using the technology for which the application was filed and the health effects obtained in patients using the technology for which the application was filed, expressed as the number of quality adjusted life years , and should it be impossible to determine this number – as the number of life years gained;

2) the estimation of the ratio of the cost of using the optional technology and the health effects obtained in patients using the optional technology, expressed as the number of quality adjusted life years, and should it be impossible to determine this number – as the number of life years gained for each of the reimbursed optional technologies;

3) the calculation of the net sales price of the technology for which the application was filed, at which the ratio referred to in subpar. 1 is not higher than any of the ratios referred to in subpar. 2.

7. If the horizon relevant for the economic analysis in the case of the technology for which the application was filed exceeds a year, the estimations referred to in par. 2 subpar. 1–4 shall be made with the account for the annual discount rate at the amount of 5% for the costs and 3.5% for the health effects.

8. If the values referred to in par. 2 subpar. 5 include the estimations of the health utilities, the economic analysis shall include a systematic review of primary and secondary trials of utilities of the health states appropriate for the model of the course of the disease adopted in the economic analysis.

9. The sensitivity analysis shall include:

1) the definition of the range of the variability of the values used for obtaining the estimations referred to in par. 2 subpar. 5;

2) the justification of the ranges of the variability referred to in subpar. 1;

3) the estimations referred to in par. 2 subpar. 1–4 obtained with the assumption of the values constituting the boundaries of the ranges of the variability referred to in subpar. 1 instead of the values used in the basic analysis.

10. The economic analysis shall be conducted in two variants:

1) from the viewpoint of the entity responsible for financing benefits with public funds;

2) from the common viewpoint of the entity responsible for financing benefits with public funds and the beneficiary.

11. The estimations referred to in par. 2 subpar. 1–4 shall be made in the time horizon relevant for the economic analysis.

12. The provisions § 4 par. 3 subpar. 3 and 4 shall apply to the reviews referred to in par. 1 subpar. 3 and par. 8.

§ 6.

1. The analysis of the impact on the budget of the entity responsible for financing benefits with public funds referred to in the third indent of Article 25 subpar. 14 item c and Article 26 par. 2 item i of the Act shall include:

1) the estimation of the annual population number:

a) comprising all patients in whom the technology for which the application was filed may be used,

b) target one specified in the application,

c) in the case of which the technology for which the application was filed is currently being used;

2) the estimation of the annual population number in the case of which the technology for which the application was filed will be used with the assumption that the minister responsible for health issues the reimbursement decision referred to in Article 11 par. 1 of the Act or the price increase decision referred to in Article 11 par. 4 of the Act;

3) the estimation of the up-to-date annual expenditures of the entity responsible for financing benefits with public funds, incurred for treating patients in the clinical condition indicated in the application, with the specification of the expenditure component constituting the reimbursement of the price of the technology for which the application was filed, if applicable;

4) a quantitative forecast of annual expenditures of the entity responsible for financing benefits with public funds, to be incurred for treating patients in the clinical condition indicated in the application, with the specification of the expenditure component constituting the reimbursement of the price of the technology for which the application was filed, with the assumption that the minister responsible for health does not issue the reimbursement decision referred to in Article 11 par. 1 of the Act or the price increase decision referred to in Article 11 par. 4 of the Act;

5) a quantitative forecast of annual expenditures of the entity responsible for financing benefits with public funds to be incurred for treating patients in the clinical condition indicated in the application, with the specification of the expenditure component constituting the reimbursement of the price of the technology for which the application was filed, with the assumption that the minister responsible for health issues the reimbursement decision referred to in Article 11 par. 1 of the Act or the price increase decision referred to in Article 11 par. 4 of the Act;

6) the estimation of additional expenditures of the entity responsible for financing benefits with public funds, to be incurred for treating patients in the clinical condition indicated in the application, constituting the difference between the forecasts referred to in subpar. 4 and 5, with the specification of the expenditure component constituting the reimbursement of the price of the technology for which the application was filed;

7) the minimum and maximum estimation variant referred to in subpar. 6;

8) tabular specification of the values based on which the estimations referred to in subpar. 1–3, 6 and 7 and the forecasts referred to in subpar. 4 and 5 were made;

9) the specification of the assumptions based on which the estimations referred to in subpar. 1–3, 6 and 7 and the forecasts referred to in subpar. 4 and 5 were made, in particular the assumptions regarding the qualification of the technology for which the application was filed to the limit group and determination of the basis of the limit;

10) an electronic document enabling the repetition of all calculations as a result of which the estimations referred to in subpar. 1–3, 6 and 7 as well as the forecasts referred to in subpar 4 and 5 were obtained.

2. The estimations referred to in par. 1 subpar. 1–3, 6 and 7 and the forecasts referred to in par. 1 subpar. 4 and 5 shall be made in the time horizon relevant for the analysis of the impact on the budget.
3. The estimations referred to in par. 1 subpar. 1–3, 6 and 7 and the forecasts referred to in par. 1 subpar. 4 and 5 shall be made in particular based on the estimations referred to in par. 1 subpar. 1 and 2. Should it be impossible to present reliable estimations referred to in par. 1 subpar. 1 and 2, the analysis of the impact on the budget may include an additional variant in which these estimations were obtained based on other data.
4. Should the applied conditions for inclusion in the reimbursement comprise the risk-sharing instruments referred to in Article 11 par. 2 subpar. 7 of the Act, the estimations referred to in par. 1 subpar. 1–3, 6 and 7 and the forecasts referred to in par. 1 subpar. 4 and 5 shall be presented in the following variants:

1) with the account for the proposed risk-sharing instrument;

2) without the account for the proposed risk-sharing instrument.

5. Should the applied conditions for inclusion in the reimbursement comprise establishing a new separate limit group, the analysis of the impact on the budget shall comprise the indication of the evidence of satisfying the requirements referred to in Article 15 par. 3 subpar. 1 and 3 of the Act.
6. Should the applied conditions for inclusion in the reimbursement comprise a qualification to the common existing limit group, the analysis of the impact on the budget shall comprise the indication of the evidence of satisfying the criteria referred to in Article 15 par. 2 and the requirements referred to in Article 15 par. 3 subpar. 2 of the Act.

§ 7.

1. The rationalisation analysis referred to in Article 25 subpar. 14 item c fourth indent and Article 26 subpar. 2 item j of the Act shall include:

1) the presentation of the solutions referred to in Article 25 subpar. 14 item c fourth indent and Article 26 subpar. 2 item j of the Act together with the estimations proving the reasonability of these solutions;

2) tabular specification of the values based on which the estimations referred to in subpar. 1 were made;

3) the specification of all assumptions based on which the estimations referred to in subpar. 1 were made;

4) an electronic document enabling the repetition of all calculations as a result of which the estimations referred to in subpar. 1 were obtained, as well as the calculation of these estimations upon the modification of any of the entered values and any of the correlations between these values.

2. Should the solutions referred to in par. 1 subpar. 1 comprise establishing separate limit groups for the reimbursed technologies, the rationalisation analysis shall include the indication of the evidence referred to in Article 15 par. 3 subpar. 1 and 3 of the Act.
3. Should the solutions referred to in par. 1 subpar. 1 comprise a qualification of reimbursed technologies to the common limit group, the rationalisation analysis shall include the indication of the evidence referred to in Article 15 par. 2 of the Act and the requirement referred to in Article 15 par. 3 subpar. 2 of the Act.

§ 8.

The analyses referred to in § 1 shall include:

1) the bibliographic data of all used publications, with the specificity level enabling unambiguous identification of each of the used publications;
2) the indication of other sources of information comprised in the analyses, in particular legal acts and personal data of the authors of unpublished trials, analyses, expert reviews and opinions.

§ 9.

This Regulation shall enter into force on the date of publication.

**MINISTER OF HEALTH**

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*I, the undersigned, Adam Maciejewski, sworn translator of the English language, hereby certify that the above document is a true and correct translation of the original document presented to me in the Polish language.*

*Warsaw, 11 April 2013* *Rep. No 239/2013*