Efficacy of non-pharmacological methods used for treating tobacco dependence: meta-analysis

Skuteczność niefarmakologicznych metod leczenia uzależnienia od tytoniu – metaanaliza

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Summary: Objectives. The present paper discusses available data concerning the efficacy of non-pharmacological methods used in smoking cessation and describes the results of newly performed meta-analyses testing the 12-month efficacy of these methods. This study is part of a more comprehensive program analyzing the efficacy and cost-effectiveness of different methods used in smoking cessation. **Patients and methods.** During the first stage of the study a systematic review of available data was made in order to identify methods used in smoking cessation and assess their efficacy on the basis of already existing reliable systematic reviews or meta-analyses. In the second stage of the study the efficacious and available in Poland methods (identified during the first stage by available data search and interviews with healthcare providers) were tested using new meta-analyses with the aim to define their efficacy in achieving at least the12-month continuous or prolonged abstinence. **Results.** The findings of the first stage of the study revealed that the reviews performed according to the Cochrane Collaboration methodology contained the most complete and up-to-date data. Meta-analyses of randomised controlled trials performed during the second part of the study showed that non-pharmacological smoking cessation methods available in Poland, namely the physician's simple advice and individual and group counseling, increased the probability of smoking cessation and smoking abstinence for ≥12 months by 1.5 to 2 times and the number of patients who need to be treated to have one patient who stops smoking was about 30 for more intensive methods and 60 for the physician's simple advice. **Conclusions.** The study confirmed that non-pharmacological smoking cessation methods available in Poland, i.e. the physician's advice and individual and group counseling, increase the probability of smoking abstinence, and determined the 12-month effects of these interventions.

Key words: individual counseling, meta-analysis, physician's advice, tobacco dependence, treatment efficacy

INTRODUCTION

Smoking is a health problem of a considerable social significance on a global scale. It is estimated that there are over one billion adult smokers all over the world. Smoking is a cause of diseases leading to premature death and disability. Smoking, particularly cigarette smoking, is a predominant risk factor for lung cancer, as well as cardiovascular and respiratory system diseases (in particular chronic obstructive pulmonary disease [COPD]) [1-3].

Available data for the years 1990–1994 for the Polish population show that approx. 30% of deaths in males and approx. 6% deaths in females were directly caused by smoking, whereas the total annual mortality attributable to smoking in Poland is estimated for approx. 70,000 (60,000 in males and 10,000 in females). For the aforementioned population, the mean loss of life span due to smoking was 21 years [4]. Currently in Poland, approximately 39% of adult males and 23% of adult females smoke cigarettes every day (according to research by Maria Skłodowska-Curie Memorial Cancer Centre and Institute of Oncology), among persons ≥40 years of age the percentage is 34% and 22%, respectively [5]. Approximate estimates show that annual expenditures on treatment of smoking related diseases in Poland amount to 18 billion PLN, and if prevalence of smoking does not change, the direct cost of treatment within 20 years will increase to 198 billion PLN [6].

Smoking cessation brings substantial health benefits. A long-term observational study showed that smoking cessation at the age of 25–34 enables gaining 10 years of life in comparison with persons still smoking, and survival curves are similar to the ones of non-smoking males. Smoking cessation at the age of 35–44 is associated with life span extension by 9 years in comparison with persons still smoking, at the age of 45–54 – by 6 years, and at the age of 55–64 – by 3 years [7]. A systematic review of 20 prospective cohort studies showed

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that smoking cessation, even among persons with already diagnosed ischemic heart disease, is associated with a reduction in death risk due to any cause (relative risk [RR] 0.64, 95% CI 0.58–0.71), as well as in the risk of repeat of myocardial infarction (RR 0.68, 95% CI 0.57–0.82) [8].

In the reports concerning the situation of health care in Poland, published in recent years, attention was drawn to insufficient, as compared with most of the industrialized countries, use of reliable information derived from scientific reports and economic analyses in the process of health policy planning and decision making in health care (e.g. in determination of list of reimbursed drugs) [9,10].

Reduction in smoking prevalence in Poland by introducing the interventions of confirmed efficacy into tobacco dependence treatment, may be translated into reduction in morbidity and mortality due to smoking related diseases, thus into reduction in costs of tobacco related diseases treatment.

Identification of methods used for tobacco dependence treatment (smoking cessation) based on systematic review and their efficacy analysis based on reliable scientific research, will make it possible to determine which of them could be of benefit and should be applied on a wider scale.

PATIENTS AND METHODS

The objective of the study was to assess the efficacy and cost-effectiveness of methods applied in tobacco dependence treatment. Current report is dedicated only to analysis of efficacy of non-pharmacological methods used in smoking cessation.

Systematic review of data to identify the tobacco dependence treatment methods

The following electronic databases were searched (in alphabetical order): Addiction Abstracts, AMED, ASH (Action on Smoking and Health), ASSIA, BIDS-IBSS, CINAHL, Cochrane Library (Database of Cochrane Systematic Reviews and DARE), Conference Paper Index, CSA, Dirline, EIFL Direct, EMBASE, ERIC, Healthstar, Hstat, IBZ, IDEAL, ISI, MEDLINE via PubMed, ProQuest, PsycINFO, Science Direct, Sociological Abstracts, Springer Link, Swetsnet, applying the following keywords:

- health problem: 1) smoking; 2) tobacco; 3) tobacco-use-disorder; 4) smok*; 5) cigaret*
- intervention: 6) treatment; 7) treat*; 8) antismok*; 9) anti-smok*
- outcome measure: 10) reduc*; 11) quit*; 12) stop*; 13) abstin*; 14) abstain*; 15) smoking cessation; 16) tobacco-use-cessation
- type of study: 17) systematic review; 18) meta-analysis; 19) metaanalysis; 20) systematic review using "clinical queries" option.

Search was limited to studies carried out on adults. Last search in the aforementioned databases was carried out in March 2004 and in the Cochrane Library in February 2005.

At that stage, the efficacy of the identified methods in increasing the probability of abstinence was assessed on the basis of the existing reliable systematic reviews and meta-analyses.

Criteria of inclusion of a study in analysis

Systematic reviews or meta-analyses, where the efficacy was assessed based on randomized trials, were included in the efficacy analysis of non-pharmacological smoking cessation methods.

To be included in further analysis an intervention was required to have its efficacy, i.e. a significant difference in the percentage of persons remaining in continuous abstinence after at least 6 months from the beginning of therapy, shown in a reliable systematic review or meta-analysis.

Availability of individual tobacco dependence treatment methods in Poland was defined based on available data and interviews with health service providers.

Reliability assessment

The identified reports were initially screened for eligibility. After selection of the studies found, their reliability was appraised in accordance with evidence-based medicine principles (EBM) based on special questionnaire drawn up in accordance with current criteria [11–19]. The critical appraisal form for systematic reviews and meta-analyses was prepared based on Critical Appraisal Skills Programme [11] and User's Guide [12] questionnaires.

The results of all the reviews were summarized, and the most up-to-date reliable systematic reviews were selected for further analysis.

Appraisal of efficacy in achieving 12-month abstinence

In the second stage of the study, for available in Poland and efficacious tobacco dependence treatment methods identified during the first stage, their impact on achieving at least 12-month continuous abstinence (refraining from smoking from the moment of smoking cessation for the period of 12 months; occasional slips/lapses are possible) or prolonged abstinence (refraining from smoking from smoking cessation for 12 months; during the first two weeks from the target date of smoking cessation, isolated slips/lapses are possible) was defined by means of newly performed meta-analyses. Application of data concerning the 12-month abstinence was associated with the fact that the available epidemiological data used in cost-effectiveness analysis and an economic model (risk of death and risk of disease) cover 12-month periods. Moreover, tobacco abstinence lasting at least one year provides a good chance of total success.

Original studies, where the treatment efficacy was expressed as 12-month, continuous or prolonged tobacco absti-

Table 1. Tobacco dependence treatment methods, which efficacy was assessed in the systematic reviews or meta-analyses found

Intervention	Number of systematic reviews/meta-analyses (years of publication)	Cochrane review
Physician's advice	2 (1997–2004) [24[a],25]	March 2004 [25][b]
Nurse's advice	1 (2004) [24[a],26]	June 2003 [26][b]
Individual counseling	1 (2002) [27]	The only review: February 2002 [27]
Group therapy	1 (2002) [28]	The only review: December 2001 [28]
Aversion therapy / silver acetate	1 (2004) [29] / 1 (1997) [30]	The only review: May 2004 [29] The only review: May 1997 [30]
Hypnosis	1 (1998) [31]	The only review: June 2001 [31]
Acupuncture	6 (1990–2002) [32-37]	The only review: January 2002 [37]
Exercise	1 (2005) [38]	The only review: August 2004 [38]
Bioresonance	None	None

[a] Last searched May 1995

[b] The most complete and up-to-date search

nence (irrespective of the year of the study publication and the number of persons subjected to intervention) were extracted from reliable systematic reviews and meta-analyses, which were used for initial efficacy assessment; the studies, where abstinence was assessed only during the week preceding the medical control, were excluded. From individual studies, there were extracted numerical data covering the proportions of patients, who ceased smoking as a result of individual interventions and remained abstinent for at least 12 months. For individual types of interventions, the results of original studies were pooled by means of meta-analysis following Mantel-Haenszel procedure [20-23], using StatsDirect statistical package. The results were presecuted as pooled values of the abstinence proportions both in the experimental and control groups, relative benefit, benefit difference, NNT (number needed-to-treat – the number of patients who need to be treated in order to have one patient who stops smoking) and 95% confidence intervals for those values. Statistical significance of the pooled results was calculated by means of the chi-square test, and homogeneity of results between the studies were examined by means of the Q test.

RESULTS

During the first stage, systematic reviews and meta-analyses assessing the efficacy of non-pharmacological tobacco dependence treatment methods listed in Table 1 were found.

The most complete and the most up-to-date data were included in the reviews made in accordance with Cochrane Collaboration methodology.

Among the non-pharmacological treatment methods, whose efficacy was unambiguously confirmed, the following are available in Poland: simple advice of a physician (short intervention lasting ≤10 minutes, involving at most 1 additional follow-up visit), individual counseling (intensive intervention, lasting >10 minutes or involving ≥2 additional follow-up visits) and group therapy.

1. Simple advice

Available reviews

Efficacy of simple advice (up to 10 minutes) in encouraging the smokers to give up smoking, in comparison with no advice, normal care or self-help materials was demonstrated in 3 systematic reviews. One of them assessed the efficacy of advice provided by physicians, nurses or other health care providers within the scope of primary health care (odds ratio [OR] 1.32, 95% CI 1.18–1.48 [24]), one review assessed the efficacy of advice provided exclusively by physicians (OR 1.74, 95% CI 1.48–2.05 [25]) and another one assessed the advice provided exclusively by nurses (OR 1.76, 95% CI 1.23–2.53 [26]).

Efficacy appraisal in achieving the 12-month abstinence

According to the information from the health service providers it was determined that in Poland simple advice is provided by physicians. Of 17 studies included in the most up-to-date and reliable Cochrane systematic review [25], 8 studies assessing efficacy of simple advice provided by a physician in achieving 12-month abstinence were included in efficacy analysis (see webappendix). All the included studies were randomized controlled trials, where the patients of the control group did not receive any advice, only self-help leaflets and normal care or did not receive any treatment.

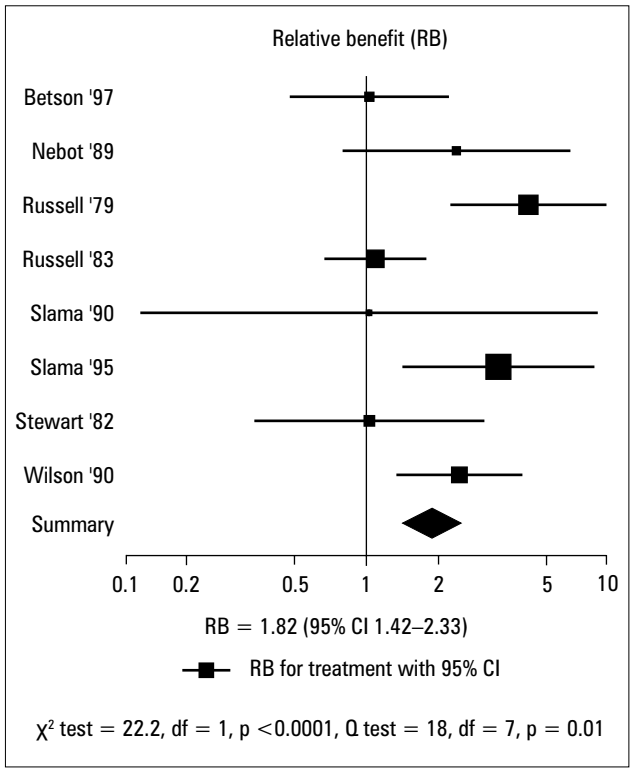

Fig. 1. Efficacy of simple physician's advice in achieving 12-month abstinence – relative benefit vs. no advice. References – see webappendix. Abbreviations: df – degree of freedom

The results of original studies included in the efficacy analysis were pooled by means of meta-analysis and substantial benefits of provision of the simple physician advice in comparison with no advice were observed (Tab. 2, Fig. 1).

2. Individual counseling

Available reviews

In 3 systematic reviews, the efficacy of different types of individual counseling provided by a physician (OR 2.04, 95% CI 1.71–2.43 [25]), a nurse (OR 1.43, 95% CI 1.24–1.64 [26]) or other health care providers (OR 1.62, 95% CI 1.35–1.94 [27]) was assessed in comparison with the control group, which was not provided with this kind of therapy.

Efficacy appraisal in achieving the 12-month abstinence

Of the aforementioned systematic reviews, further analysis covered randomized controlled trials, where the outcome measure was the 12-month abstinence: 8 studies concerning counseling provided by a physician, 2 concerning counseling provided by a nurse and 5 concerning counseling provided by different health care providers (see webappendix). In each study the patients in the control group were provided with simple advice.

The results of original studies included in the efficacy analysis were pooled by means of meta-analysis and substantial benefits were observed (Tab. 2, Fig. 2).

3. Group therapy

Available reviews

Efficacy of different types of group psychotherapy in comparison with the control group receiving self-help materials or advice (OR 1.97, 95% CI 1.57–2.48) and in comparison with the control group not provided with any treatment (OR 2.19, 95% CI 1.42–3.37) was demonstrated in one systematic review [28].

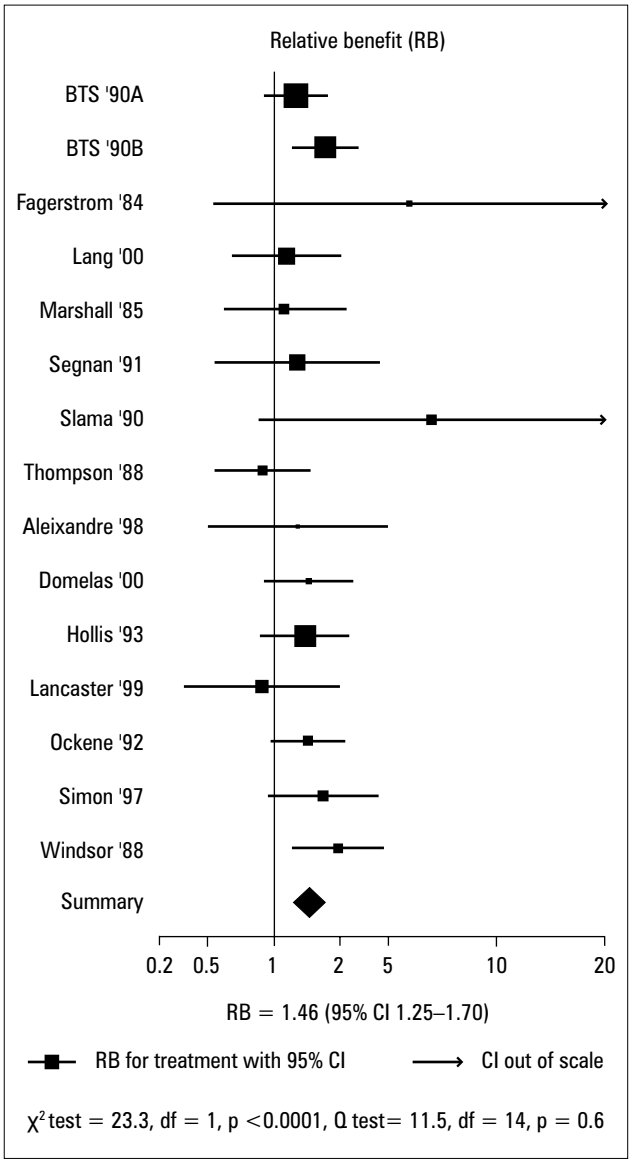

Fig. 2. Efficacy of individual counseling in achieving 12-month abstinence – relative benefit vs. simple advice. References – see webappendix. Abbreviations – see Fig. 1

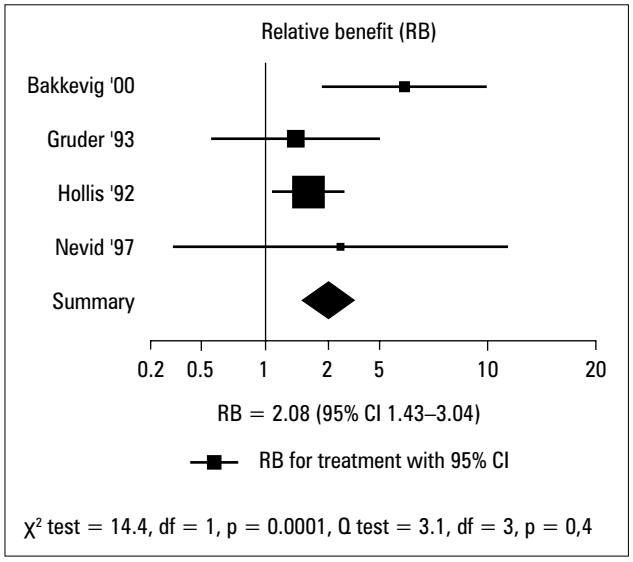

Fig. 3. Efficacy of group therapy in achieving 12-month abstinence – relative benefit vs. simple advice. References – see webappendix. Abbreviations – see Fig. 1

Efficacy appraisal in achieving the 12-month abstinence

From the number of 24 studies included in systematic review, 4 were included in the efficacy analysis, where the efficacy of group therapy in the 12-month abstinence was evaluated (see webappendix). All the included studies were randomized controlled trials, where the patients of the control group were provided with simple advice and in some studies also with self-help leaflets.

The results of original studies included in the efficacy analysis were pooled by means of meta-analysis and substantial benefits of group therapy in comparison with simple advice were observed (Tab. 2, Fig. 3).

4. Other non-pharmacological methods of treatment

Available reviews

The systematic reviews or meta-analyses found did not unambiguously showed the efficacy of the following non-pharmacological methods:

- aversion therapy and silver acetate (aversion therapy consists of simultaneous application of positive [smoking] and negative reinforcement [e.g. quick smoking of a large number cigarettes and simultaneous concentration on unpleasant impressions or application of silver acetate, which produces unpleasant taste] to create a new conditioned response and thus modified behavior) [29,30]
- hypnosis [31]
- acupuncture [32-37]
- exercise [38].

Systematic reviews, meta-analyses or randomized controlled trials concerning the effectiveness of so-called bioresonance in tobacco dependence therapy were not found [39,40].

DISCUSSION

The analysis of systematic reviews and meta-analysis of randomized controlled trials assessing the non-pharmacological tobacco dependence treatment methods demonstrated efficacy of the methods available in Poland, viz. the physician's simple advice, individual counseling and group therapy, in increasing the probability of the 12-month tobacco abstinence. For all the aforementioned methods, the probability of smoking cessation in comparison with the control group increased approx. by 1.5 to 2 times. However, the number of patients who need to be treated in order to have one patient who stops smoking (NNT) for the physician's simple advice in comparison with no-advice was 60, and for individual counseling and group therapy in comparison with simple advice it was 36 and 31, respectively. The results of the study are consisted with the results of other studies and with guidelines for tobacco dependence treatment [41-44].

There is, therefore, the possibility of effective influence on smoking cessation showed by scientific research. However, according to information provided by individual departments of the National Health Fund (Narodowy Fundusz Zdrowia – NFZ) or via their websites in 2004, nicotine dependence clinic services (code 1742) were contracted only in 5 NFZ departments. Moreover, smoking advice is one of the components of the cardiovascular disease prophylaxis program and the COPD prophylaxis program currently being contracted in most of NFZ departments.

Apart from non-pharmacological interventions, there are also effective pharmacological methods of tobacco dependence treatment, like nicotine replacement therapy, bupropion or varenicline, recently released on the market. Their addition to non-pharmacological methods results in higher probability of smoking cessation than when applying non-pharmacological methods alone, and NNT ranges from 6 to 21. However, their application cost for the patient is higher, especially as those drugs are not reimbursed (in the year 2004, cost of simple advice was estimated at ca. 7 PLN/day, and that of pharmacological treatment at ca. 10 PLN/day) [45].

Smoking cessation is associated with the reduction in risk of death and morbidity due to tobacco related diseases, therefore, it seems justifiable to introduce a systematic approach to treatment of this dependence using the methods of confirmed effectiveness and, at the same time, to provide information concerning the effectiveness or ineffectiveness of various methods both to physicians and, first of all, to patients.

"Konsensus dotyczący diagnostyki i leczenia zespołu uzależnienia od tytoniu" drawn up by multidisciplinary team of specialists and published in 2006 [44] states that treatment of tobacco dependence is a physician's obligation and he should

Table 2. Efficacy of individual non-pharmacological tobacco dependence treatment method in achieving 12-month abstinence

Method	Treatment % (95% CI)	Control % (95% CI)	Relative benefit (95% CI)	Benefit difference (95% CI)	NNT (95% CI)
Simple physician's advice vs. no advice	3.7 (3.2–4.2)	2.05 (1.62–2.48)	1.82 (1.42–2.33)	0.017 (0.01–0.023)	60 (43–99)
Individual counseling vs. simple advice	9.1 (8.3–9.9)	6.2 (5.5–7.0)	1.46 (1.25–1.70)	0.029 (0.017–0.04)	36 (26–59)
Group therapy vs. simple advice	6.3 (4.9–7.7)	3.0 (2.2–3.9)	2.08 (1.4–3.0)	0.03 (0.02–0.05)	31 (21–62)

NNT – the number of patients who need to be treated in order to have one patient who stops smoking (number needed-to-treat)

ask his patients about smoking, just the same as he asks about disease symptoms while taking their medical history, and should encourage them to give up the habit, presenting different available possibilities of non-pharmacological and pharmacological support. It is also recommended to introduce tobacco dependence treatment to the programs financed by the NFZ. Although the act of 9 November 1995 on protection of health against the consequences of using tobacco and tobacco products, as amended [46], maintains that treatment of tobacco dependence provided in public health centers is free, the number of contracted nicotine dependence clinic is not buoyant. Cardiovascular disease prophylaxis programs financed by the NFZ include health education and encouragement to change lifestyle, the COPD prophylaxis program describes also smoking advice.

It is extremely important to make physicians and other health care providers aware of the fact that even a simple few minutes' advice may increase a smoker's motivation to give up the habit. Health campaigns in Poland had impact on both the smokers' and the health care providers' awareness of significance of this health problem. This, however, may not yet adequately translate into practice, due to the fact that physicians still do not ask all their patients about smoking habit and do not advice them to give up smoking [47]. Starting of training in tobacco dependence treatment already during medical studies seems to be helpful.

Presentation of the tobacco dependence problem in the specialist training programs is also insufficient. In current programs for general practitioners, the contents of public health course mention nicotinism [48]. In the pulmonology training programs, within the scope of the required competence, knowledge of smoking eradication rules was mentioned [49]. This training was not clearly included in the internal medicine and cardiology programs [50,51]. It was only mentioned in the latter program that the aim of the current course on health promotion is to familiarize a physician becoming a specialist with contemporary rules of prevention of coronary heart disease and arterial hypertension risk factors, as well as promotion of healthy lifestyle, and the scope of training should include epidemiology, diagnostics and therapy in persons with atherosclerosis, coronary heart disease and arterial hypertension risk factors [51].

The second aspect raised in the presented study is assessment of possibility of broader use of reliable information from scientific reports in the process of health policy planning and in health care decision making, both at the level of central authorities, and at the lowest level, i.e. in a surgery. In most of the tobacco dependence treatment methods, the most up-to-date and reliable, and usually the only source of information, was the systematic review published in the Cochrane Library, which is currently available free of charge for everyone in Poland (Medical Technology Assessment Agency, website: www.aotm.gov.pl). The Medical Technology Assessment Agency was established by the directive of the Minister of Health of 30 June 2006 [52]. Its establishment boosts hope for still broader use of scientific evidence in health care decision making in Poland (according to EBM principles). Drawing up, verification, collection, making available and dissemination of information about assessment of medical technology made in the Republic of Poland and other countries and production of recommendations concerning medical technology for the minister in charge of health are among its objectives.

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