Peer reviewed article

DNR orders at a tertiary care hospital – are they appropriate?

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Summary

Questions under study: There are no established recommendations in Switzerland on when, how and for what patients DNR orders should be written. Moreover, little is known about current attitudes, patients' preferences, patients' involvement in decision-making and the adequacy of such decisions. The study was conducted in a Swiss tertiary care hospital to investigate the epidemiology, manner of application and appropriateness of DNR orders.

Methods: We performed retrospective chart review of all patients admitted to the department of general internal medicine of a Swiss tertiary care university hospital during four randomly selected months of the year 1998 (group 1) as well as of all patients who died in the department during 1998 (group 2). We assessed the frequency of DNR orders on admission and before death, their association with age, sex, diagnostic category, comorbidity and physical/social dependence, and the frequency of patient and/or family involvement in decision-making.

Results: On admission, a DNR order was written for 15% of all hospitalised patients and 54% of the patients dying during the observation period; 93% of patients ultimately dying were the subject of DNR orders before death. There was a significant association between DNR orders and patients' age ($p < 0.001$), physical and/or social dependence ($p < 0.001$) and the admission diagnoses malignancy ($p < 0.001$) or acute stroke ($p < 0.005$). Cardiovascular disease was in inverse ratio to DNR orders ($p < 0.001$). Only 6% of either patients or families were reportedly involved in decisions in the overall group, whereas this was the case in 58% of patients who died in hospital

Conclusions: The frequency of DNR orders on admission was rather high. Referring to pre-arrest morbidity, DNR orders were often inappropriate on hospital admission but usually became so during hospital stay. After exclusion of confounding factors, age was the main independent factor for DNR orders. Patient and/or surrogate involvement in decision-making for DNR orders was low, thereby raising important ethical issues such as patient autonomy. An urgent national discussion on the topic is needed.

Key words: CPR; DNR; resuscitation; do not resuscitate; life-sustaining treatment; cardiopulmonary arrest; survival; prognosis; informed consent

Introduction

Cardiopulmonary resuscitation (CPR) by closed chest massage was introduced in 1960 for cardiopulmonary arrest due to an acute insult from myocardial infarction, electric shock, untoward effect of drugs, anaesthetic accident or surgery [1]. Subsequently, the indication for CPR was expanded to cardiopulmonary arrest in any hospitalised patient regardless of the underlying disease. Concomitantly, the success of CPR has declined since the underlying disease is one of the main determinants of the prognosis of CPR [2–4]. Undoubtedly, CPR can lead to undue suffering and unnecessary cost when administered indiscriminately [5]. DNR (Do Not Resuscitate) order rates reported in the literature vary between 3 and 24% for patients on a ward [6–8]. Despite the fact that important data on the patients who may profit from CPR have been published [3, 9, 10], guidelines on writing DNR orders are very sparse in Europe and exist – if at all – almost exclusively at the institutional but scarcely at the national and definitely not at European level. An exception are the British Guidelines recently issued jointly by the British Medical Association, the Resuscitation Council and the Royal College of Nursing.

While discussion of DNR orders has been in-

Financial support: D.E. Uehlinger is supported by grant # 32–49585.96 from the Swiss National Science Foundation.

tensive in the United States, this has been much less the case in Europe and particularly in Switzerland. It is common practice in most Swiss hospitals – such as our institution – to note in the patient's chart on admission whether or not the patient would/should be resuscitated in the event of cardiopulmonary arrest. We are not aware, however, of guidelines in Switzerland implementing explicit criteria justifying DNR orders, such as pre-arrest morbidity (PAM) scores and prognosis after resuscitation (PAR) scores [9, 10]. In our personal experience of several tertiary and secondary care hospitals in Switzerland it is not common practice to involve patients systematically in the decision regarding possible CPR. There are some local but no national recommendations in Switzerland on when and for what patients DNR orders may be written without informed consent or when the patient is no longer competent. To our knowledge, few data are available in Swiss hospitals on current attitudes, actual patient preferences, frequency of proxy involvement in this kind of decision-making and the adequacy of such decisions. In our daily work it has been our experience that DNR orders are sometimes made arbitrarily and do not always comply with recommendations based on pre-arrest morbidity [9, 10].

This study is designed to investigate the epidemiology and manner of applying DNR orders, and their appropriateness with respect to scientific and ethical issues, in a Swiss tertiary care university hospital.

Methods

The study was conducted in the Department of General Internal Medicine at Inselspital Bern, a 1000-bed university hospital in Switzerland with a catchment area of some 1m inhabitants. Retrospective chart review of all patients admitted to this department during four randomly selected months of the year 1998 (group 1; n = 882) was performed. Since we expected that the DNR order rate would differ between an overall case mix of patients admitted to a department of general internal medicine and the patients who die in such wards, we reviewed the charts of all patients who died in the department during 1998 (group 2; n = 174) separately. The data gathered from retrospective chart review included age, sex, diagnostic category and comorbidity on admission (cardiovascular, respiratory, gastrointestinal and liver, renal, neuro, infection, malignancy, psychiatric, other), the presence or absence of physical and/or social dependence (defined as needing help for everyday activities); whether or not a DNR order was written; how often DNR orders were modified and how often physicians discussed the possibility of cardiopulmonary resuscitation with patients or their families. Finally we recorded the number and circumstances of actual CPR given.

Statistical analysis

The software package SYSTAT was used for data analysis (Systat 9.0; SPSS Inc., Evenstone, IL). Values are given as mean ± standard deviation (SD) or as median and range for parameters that did not follow normal distribution.

Due to an overlap between the two groups (the 59 patients of group 1 who died during the 4 randomly selected months are also members of group 2, i.e. all the patients who died during one year), statistical analyses were restricted to comparisons within groups. When the whole population was analysed, these patients were listed only once.

The relationship between DNR orders and patient parameters, diagnostic categories (cardiovascular, respiratory, gastrointestinal and liver, renal, neuro, infection, malignancy, psychiatric, other), comorbidities (see diagnostic categories), the total number of comorbidities as well as in-hospital death (group 1 only) were investigated by univariate and multivariate logistic regression analysis.

After identification of possible associations between DNR orders and the parameters described above with univariate logistic regression models, multivariate automatic forward and backward stepwise logistic regression procedures were used to study these relationships further.

Results

Demographic data concerning the population studied are given on table 1. In group 1, the most common diagnostic category was cardiovascular disease (37%), followed by gastrointestinal and liver disease (11%), malignancy (10%), infectious disease (9%) and neurological disease (chiefly acute stroke) (8%). Distribution was different in group 2, where the most common diagnostic categories were malignancy (22%) and neurological disease (21%). Cardiovascular disease ranked only third with 20%.

The overall frequency of DNR orders on admission was 15% (128/882) in group 1 and 54% (95/174) in group 2. In group 1, the frequency of DNR orders was about 5% for patients aged below 70 years, then grew to 20% for patients aged 70–80 years, 46% for patients in their eighties and 72% for patients aged over 90, reflecting a strong association between DNR and age ($p < 0.001$). In group 2, the frequency of DNR orders was higher for patients of all age groups as compared with group 1, but was still related to age ($p < 0.001$) (fig. 1). The odds ratio for each additional year above age 16 (group 1) and age 18 (group 2) was 1.08 and 1.06 respectively. No patient aged under 30 was the subject of a DNR order.

The impact of physical and/or social dependence on DNR rate was striking in group 1, where

Table 1

Demographic data of population studied.

	group 1	group 2
n	882	174
male / female (%)	45 / 55	56 / 44
age (median/range)	63 / 16–105	70 / 18–97
hosp. stay in days (median/range)	7 / 1–105	9 / 1–102
mortality rate (%)	7	100
DNR orders at admission (%)	15	54
DNR orders at end of hosp. (%)	22	93

DNR orders had been written for 47% of the patients who needed help in their daily activities but only for 6% of those who were independent ($p < 0.001$). In group 2, the numbers were 71 and 46% respectively ($p < 0.01$). Additional univariate associations with DNR orders were found for retired patients in both groups ($p < 0.001$ and $p < 0.001$) and for female patients in group 1 ($p < 0.001$).

The principal admission diagnoses associated with DNR orders in both groups were malignancy ($p < 0.001$ and $p < 0.01$) and acute stroke ($p < 0.001$ and $p < 0.02$) (fig. 2). On the other hand, cardiovascular disease was in highly significant inverse ratio to DNR orders in both groups ($p < 0.001$ and $p < 0.001$ respectively), which means that admission for cardiovascular disease prevented prescription of DNR orders. No ratio was found between DNR orders and the other diagnostic categories.

Comorbidity was found to have an influence on the frequency of DNR orders in neurological disorders ($p < 0.01$), infectious disease ($p < 0.01$), cardiac disease ($p < 0.01$) and malignancy ($p < 0.001$) and in the total number of comorbidities ($p < 0.001$) in group 1. Such univariate associations with DNR orders were not seen in group 2.

During the hospital stay, DNR orders were modified in 7% of patients in group 1 and in 39% of patients in group 2. The frequency of the modifications was strongly influenced by the underlying disease (table 3). With the exception of a single case, the modification always consisted in writing of a DNR order for patients who had not initially been designated DNR. In almost two-thirds of patients the modification took place on the day of death or the day before. These modifications resulted in DNR orders before death in 93% of the patients in group 2. 13 patients in group 2 (7%) underwent unsuccessful CPR, the majority having been originally admitted for acute cardiovascular disease. Mortality in group 1 patients for whom DNR orders had been written during the hospital stay was 30% compared with 7% in the overall group; 4 patients were successfully resuscitated.

The parameters showing significant univariate associations with DNR orders were combined into a multivariate logistic regression model. For group 1 these parameters were age, sex, working status prior to admission, physical and/or social dependence, the admission diagnoses cardiac disease (inverse ratio), neurological disorders or malignancy, the comorbidities cardiac disease, infectious disease, neurological disorders or malignancy, and the total number of comorbidities. For group 2 the parameters associated with DNR orders were age, working status prior to admission, physical and/or social dependence and the admission diagnoses cardiac disease (inverse ratio), neurological disorders or malignancy. Automatic forward and backward stepwise procedures were used to identify the appropriate multivariate logistic regression models.

The final models revealed significant multi-

Figure 1

Frequency of DNR orders as a function of age shows a significant correlation. (Moreover, in 85 patients <30 years no DNR orders were written, for 1 patient aged 105 years a DNR order was written on admission.)

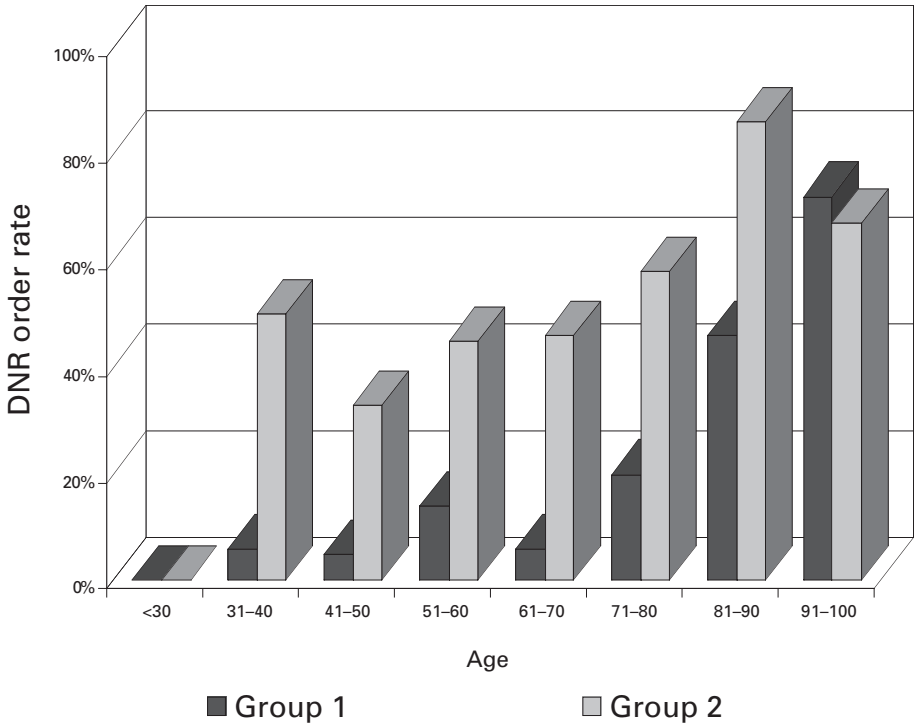

Table 2

Final multivariate logistic regression models for the dependence of DNR orders on various parameters in group 1 and group 2.

Parameter	odds ratio	upper 95% CI	lower 95% CI	p-value
group 1				
age, yrs	1.08*	1.11	1.06	p <0.001
physical/social dependence	7.59	13.12	4.39	p <0.001
admission diagnoses: cardiac disease	0.21	0.39	0.11	p <0.001
malignancy	5.89	12.04	2.87	p <0.001
Including in-hospital death: age, yrs	1.08*	1.11	1.06	p <0.001
physical/social dependence	7.24	12.82	4.09	p <0.001
admission diagnoses: cardiac disease	0.20	0.39	0.10	p <0.001
malignancy	5.75	12.12	2.72	p <0.001
In-hospital death	6.80	15.71	2.94	p <0.001
group 2				
age, yrs	1.06+	1.09	1.03	p <0.001
admission diagnoses: neurological disease	5.96	15.62	2.27	p <0.01
malignancy	8.21	21.63	3.11	p <0.01

* odds ratio for each additional year above age 16
\+ odds ratio for each additional year above age 18

variate associations of DNR orders with age, physical and/or social dependence and the admission diagnoses cardiac disease and malignancy for group 1 (table 2), and with age, physical and/or social dependence and the admission diagnoses neurological disorders and malignancy (table 2). Addition of in-hospital death as a covariate to the final multivariate model for group 1 did not alter the selection of parameters (table 2).

According to the retrospective chart review, only 6% (50/882 patients) of either the patients or their families in group 1 were reportedly involved in the decision concerning potential resuscitation measures. Among these 50 patients, the discussion took place with the patients in 10 cases, with the patient and his family in 17 cases and with the family excluding the patient in 23 cases. Mortality in the informed consent subgroup was much higher (57%) than in the overall group (7%). In group 2, i.e. in the group in which all the patients died, the information rate concerning potential resuscitation was substantially higher, consisting of 58% of

Figure 2

Frequency of DNR orders shows a correlates significantly with the admission diagnoses malignancy and neurological disease, and is in inverse ratio to cardiovascular disease.

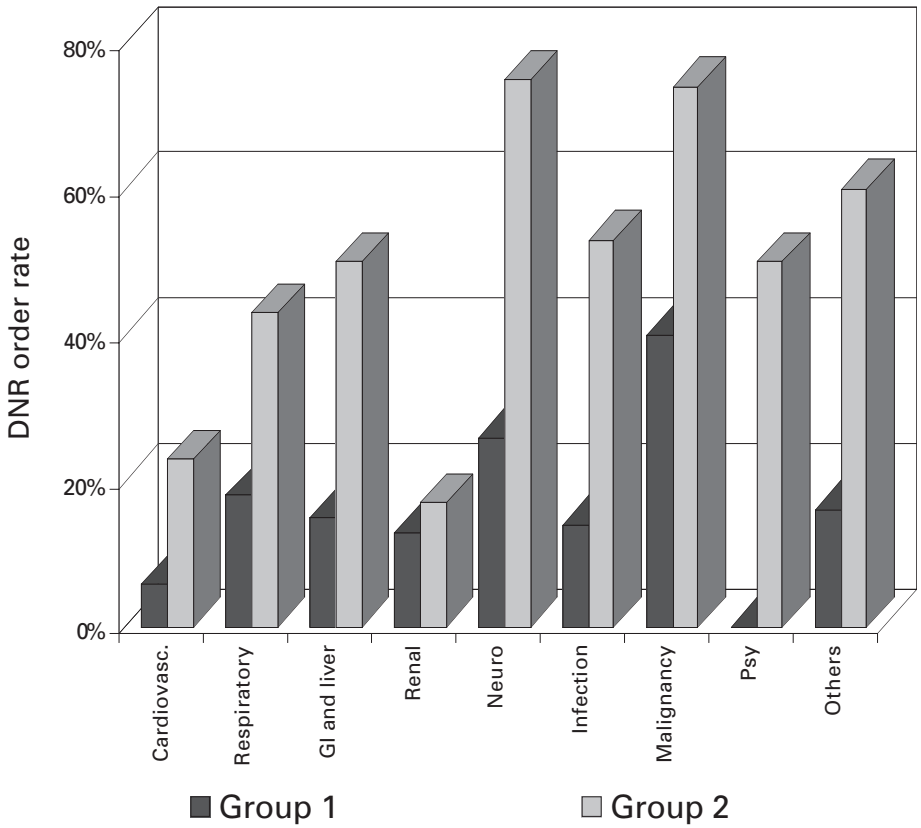

Table 3

DNR on admission and during follow-up in the different diagnostic categories.

DNR at admission and follow-up

admission diagnosis	group 1			group 2		
	n	DNR at admission %	DNR follow-up %	n	DNR at admission %	DNR follow-up %
metastatic malignancy	42	67	88	28	89	100
non metastatic malignancy	9	22	22	1	100	100
chemotherapy	27	19	19	2	50	100
pneumonia	14	14	29	2	100	100
sepsis / septic shock	5	20	40	6	32	83
acute stroke with focal deficit	17	30	47	20	80	100
renal failure	27	15	37	5	0	100
acute coronary syndrom	56	5	13	19	16	64
elective cardiovasc. intervention	183	5	7	3	0	66
GI and liver	96	21	21	16	50	100
respiratory	22	36	36	7	43	86

patients. However, the discussion took place mainly with the family (40%), to a lesser extent with the family and the patient (12%) and with the patient alone in only 6%. In both groups the discussion concerned opting for renunciation of CPR in almost all cases.

Discussion

The frequency of DNR orders on admission was 15%. Referring to pre-arrest morbidity, DNR orders were often inappropriate on hospital admission but usually became so during hospital stay. After exclusion of confounding factors, age, dependency and admission diagnosis were the main independent factors for DNR orders. Patient and/or surrogate involvement in decision-making for DNR orders was low.

Compared to data from the literature [6–8], the frequency of DNR orders on admission was rather high in our study. We attribute this finding to the societal trend in recent years towards increasing acceptance of DNR orders as well as withdrawal and withholding among doctors and patients. This subject has been studied extensively in intensive care, where, according to several studies, withdrawal or withholding precede death in 70–90% of patients [11–13]. Fewer data on this subject are available for patients on medical wards.

Our physicians apparently considered DNR orders appropriate in a high percentage of patients over 80, as age was the main independent determinant for writing a DNR order in all patients in our study. Several studies suggest that age is an important determinant of survival after CPR [14–16], but many studies attribute the poorer outcome to concomitant disease rather than to age itself [3, 17–21]. As patients were – reportedly – only rarely involved in decisions concerning potential resuscitation efforts, we do not know whether the high DNR order rate in elderly patients corresponds to our patients' desires, or, in other words, whether they can be considered appropriate from an ethical point of view.

Despite the fact that the frequency of DNR orders was strongly dependent on diagnostic categories, the physicians in our study seemed not always to have been aware of the particularly bad prognosis of CPR associated with certain illnesses. While a diagnosis of metastatic tumour or stroke correlated significantly with DNR orders, other diagnostic categories such as pneumonia, septic shock or renal failure, which have just as dismal a prognosis as the former categories in cases of cardiopulmonary arrest followed by CPR [3, 9, 10, 17], were not associated with as many DNR orders. The same was true of patients with metastatic malignancy when hospitalised electively for chemotherapy, and for patients with NYHA grade IV heart failure. This confirms inequities among patients with different diseases but similar prognosis, as described in the SUPPORT study [22]. Interestingly, however, for all but the septic and cardiovascular patients of the above-mentioned high risk diagnostic categories a DNR order was written as death was approaching. This attitude allowed most of the dying patients to die peacefully without undergoing futile resuscitation attempts before death. We have no evidence that some of these patients would have survived if CPR had been performed, but we cannot exclude it either. Another patient group with an unfavourable prognosis in the case of CPR are housebound patients [3, 4]. Whether the physicians who noted significantly more DNR orders in patients who were

physically or socially dependent and therefore often housebound were aware of this finding, or whether they were guided by intuition or prejudice, cannot be answered because of the retrospective nature of our study. Overall, physicians may have distrusted prognostic information as long as patients did relatively well, and in their decision to apply or withhold CPR physicians seem to have been guided more by the disease evolution than by prognostic data as given in the literature. The SUPPORT study, for example, underlines this hypothesis, having clearly demonstrated that more accurate prognostic estimates did not influence therapeutic decision-making as strongly as might have been expected [23, 24].

A striking finding of our study is the small number of patients who were directly involved in decision-making with respect to DNR orders. This finding, however, relies on notes in the charts, which raises the possiblity that patient involvement may have been underestimated due to incomplete documentation. We attribute this, and the fact that the physicians were more likely to consult with the family than with the patient, to three things. First, as recently stated for France [25], paternalism remains fairly prevalent for questions of this nature in Switzerland; second, patients may no longer have been competent to participate in the decision-making process, and third, physicians may have felt uncomfortable about confronting their sickest patients with this topic, and desirous of not inducing further anxiety and distress by discussion of imminent death. Even if patient involvement in the present study was comparable to data from other countries [26–29], we consider the low patient participation rate in end-of-life decisions alarming, bearing in mind possible underestimation of patients actively participating. Due to the retrospective nature of our study we cannot answer the question of how many of our patients really would have desired more active participation and how many would have preferred doctors to take this decision unilaterally. In our personal experience most patients appreciate involvement in end-of-life decisions. In a study by Lo et al [30], 68% of all patients interviewed would have wished to discuss life-sustaining therapy but only 6% had the chance to do so. Similarly, 93% of private physicians and 100% of house officers considered that CPR should be discussed with patients. Only 10% actually did so, while 21% talked to the family. A number of studies suggest that physicians as well as nurses, relatives and friends generally lack systematic understanding of their patients' resuscitation preferences. Agreement between proxy judgements by either physicians, nurses or family members and the patients' actual wishes is no better than that due to chance alone [3, 26, 30–36]. We are therefore convinced that a major effort is needed to involve patients in informed decision-making with respect to end-of-life decisions. The discussion must take place relatively early in the course of the disease, while patients remain competent. Informed decision-making for or against CPR requires, however, a major effort by the health care team, since both patients and families often overestimate the chances and prognosis of CPR, sometimes ask for futile treatment and easily change their minds [5, 28, 37–39]. Whether CPR needs to be discussed with every (hospitalised) patient is open to debate. Respect for patients' autonomy would require discussion with every patient, but this may cause more problems than it solves. Unexpected cardiopulmonary arrest due to an acute insult without severe underlying disease, and therefore with a realistic chance of surviving CPR, is a rare event. Weighing potential benefit in the balance against unnecessary psychological stress may tilt it against discussion of CPR in terminally ill patients who have very little chance of surviving CPR on the one hand, and in (young) patients at low risk of cardiopulmonary arrest on the other. As shown in our study, prescribing a DNR order by no means equals 100% mortality; hence writing DNR orders without informed consent may only rarely be harmful. On the other hand, as the option in favour of CPR in the case of cardiopulmonary arrest was rarely if ever discussed with the patient, this strategy may violate patients' autonomy as much as renunciation of it.

In conclusion, many decisions on possible CPR were inappropriate on scientific and ethical grounds: age was the strongest independent argument in favour of DNR orders, a finding which is in conflict with data in the literature; many of the patients in the prognostically very unfavourable categories in cases of cardiopulmonary arrest were not the subject of DNR orders on admission, yet none was resuscitated; the low patient involvement rate, even if possibly underestimated by the retrospective nature of the study, contravenes one of the modern principles of bioethics, namely patient autonomy. It is our duty to preserve life when it is possible and desired by the patient on one hand, and, on the other, not to administer futile treatment but vouchsafe a dignified death when it is inevitable. This can only be achieved when we are aware of our patients' wishes. Pending further studies addressing the question of how far and under what circumstances Swiss patients really wish to be involved in this kind of end-of-life decision, discussion of preferences with regard to end-of-life issues should become a natural part of modern patient management, especially in patients with chronic, debilitating disease. Binding regulations on this issue should be established and adopted by health care institutions.

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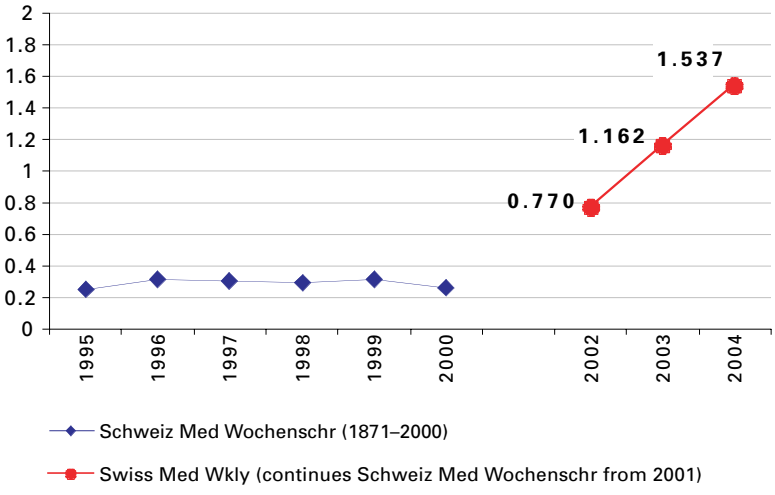

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