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ORIGINAL RESEARCH

Asthma control in primary care in Sweden: a comparison between 2001 and 2005

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Abstract

Aim: To compare the degree of asthma control in 2001 and 2005 in a primary care setting in Sweden.

Method: Two similar questionnaire surveys were performed in 2001 and 2005 with 1,012 and 224 asthma patients aged 18-45 randomly selected from 42 and 56 primary health care centres, respectively. A classification of asthma control similar to the GINA guidelines was made using information obtained from the questionnaire.

Results: In 2001, 36.6% had achieved asthma control, 23.8% were partly controlled and 39.6% uncontrolled. In 2005, the corresponding figures were 40.2%, 26.8% and 33.0%, respectively, with no difference between the two surveys (p=0.114). Uncontrolled asthma was more common in women (p<0.001 in the first and p<0.05 in the second survey) and smokers (p<0.01 in the first and p<0.01 in the second survey). The use of combination corticosteroid/long-acting bronchodilator inhalers had increased – 34.2% and 48.2%, respectively (p<0.001) – and many patients used their inhaled corticosteroids periodically.

Conclusion: In spite of treatment guidelines many patients in Swedish primary care still have insufficient asthma control.

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Keywords asthma, primary care, asthma control, GINA guideline, Sweden, questionnaire surveys

Introduction

Asthma is a common chronic disease, affecting daily activities in many patients. Several studies have demonstrated that a substantial number of asthma patients do not achieve treatment goals as specified in international guidelines.[1-3]

The Global Initiative for Asthma (GINA) is an internationally-accepted guideline with proposed goals for asthma treatment and management.[4] Until 2005, disease severity was separated into four levels, but in the more recent guideline an assessment of asthma control is recommended.[4,5] The degree of asthma control is divided into three levels – "controlled", "partly controlled" and "uncontrolled". The aim of asthma treatment should be to achieve complete control, characterised by no daytime symptoms or need for reliever (twice or less per week), no limitations of activities, no nocturnal symptoms, no exacerbations and normal lung function.

Most studies of asthma control have been population-based and have included patients treated both in primary and secondary care.[1,2,6,7] Some studies, performed entirely in primary care, have demonstrated the same lack of asthma control as in the population-based studies.[8,9] In Sweden, as well as in several other countries, the majority of adolescents and adults with asthma are treated in primary care.[10]

It is also important to evaluate possible changes in asthma control over periods of time, but to our knowledge no such study has been published with data on randomly selected patients managed in primary care. The aim of this study, therefore, was to compare the extent of asthma control in two cross-sectional surveys performed in 2001 and 2005 in a primary care setting in Sweden.

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Methods

Sampling

In the first survey in 2001, the organisation of asthma care at primary health care centres (PHCCs) in mid-Sweden was investigated.[11] Of the 238 PHCCs, the smallest ones were excluded (PHCCs with catchment areas with fewer than 3,000 inhabitants) and the remaining 193 were stratified into three groups according to their organisation of asthma clinics. From these strata, a proportional random sample of 42 PHCCs was drawn.[12]

Each of the 42 PHCCs generated a list of all patients with an asthma diagnosis who attended the PHCC because of asthma at least once during the previous 18 months. From these lists, samples of patients in the age range 15-45 years were drawn. From lists containing 40 or fewer, all patients were sampled, while from longer lists a random sample of 40 patients was drawn, generating a total of 1,477 patients.

In the second survey in 2005, 56 PHCCs were randomly sampled from the same geographic region as in 2001. PHCCs with catchment areas with fewer than 3,000 inhabitants were excluded, as well as three PHCCs that declined to participate. Each PHCC generated a list of all patients with an asthma diagnosis attending the PHCC during the previous four years. From these lists, random samples of 22 patients in the age range 18-75 years were drawn. At a few PHCCs with fewer than 22 patients, all patients were sampled, generating a total of 1,221 patients.

In order to have comparable groups in the two surveys, only patients aged 18-45 who had attended their PHCC because of asthma at least once during the previous 18 months were included in the 2005 survey. A total of 69% of the responders in this age group could be included.

Data collection

A questionnaire was mailed to the patients with two reminders when necessary. In the 2001 survey questionnaire, returned by a total of 77% of the patients, information was sought on demographics, asthma medication, symptoms, allergy, emergency consultations, smoking habits, and sick leave. Other questions concerned the use of β_2-agonists as rescue medication, night awakenings, emergency consultations, and use of oral steroids, i.e. the attainment of treatment goals. An abbreviated English version of the first questionnaire has previously been published.[13]

The 2005 survey questionnaire, returned by a total of 60% of the patients in the 18-45 year age group, posed the same questions about demographics, asthma medication, symptoms, emergency consultations, use of oral steroids, smoking, and sick leave. There were also questions about height, weight and the severity level of asthma as assessed by the patient.

A simplified version of the definition of asthma control with three levels – controlled, partly controlled and uncontrolled – was constructed, similar to the definition in the 2006 GINA guideline. The definitions of the levels of asthma control used in this study are shown in Figure 1. The main difference from the GINA guidelines was the lack of lung function data.

Both surveys were performed during the winter season, and both questionnaires contained the same questions about asthma control.

A telephone interview was performed in the 2001 survey with 104 non-responders (27% of the non-responders), and 70 (67%) agreed to be interviewed. In these interviews an abbreviated form of the questionnaire was used. In addition, some variables such as age and sex were known for 90% of the 104 non-responders. There was no telephone interview with non-responders in the 2005 survey but the age and sex of all non-responders was known.

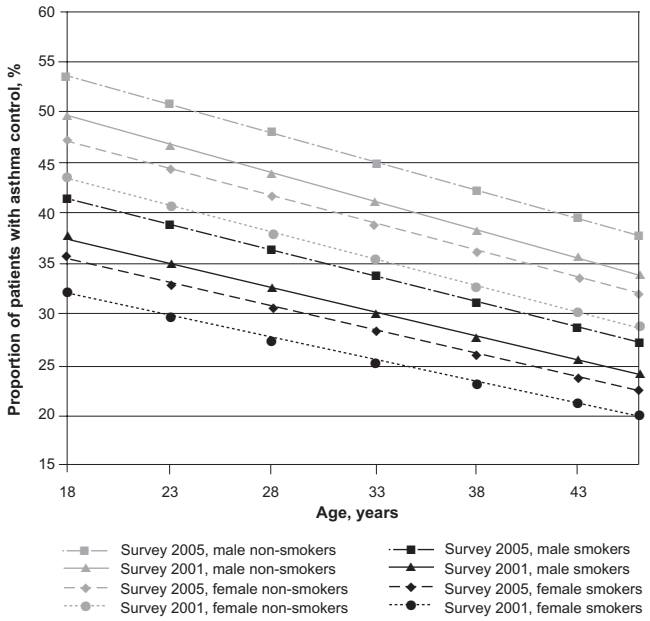
Figure 1. Criteria for asthma control. The criteria are based on the definition of asthma control in GINA 2006.

Characteristic	Controlled	Partly controlled		Uncontrolled[1]	
Night awakening due to asthma symptoms	None	One or more nights last week	One of these present last week	One or more nights last week	Both present last week
Need for reliever	Twice or less last week	Three times or more last week		Three times or more last week	
Exacerbations[2]	None	None		One or more exacerbations last six months[2]	

[1] Uncontrolled is defined as either night awakening and need for reliever or exacerbation.

[2] Unscheduled visit or oral course of steroids.

Figure 2. Proportion of patients with asthma control in relation to survey, age, sex and smoking.



The Research Ethics Board at Uppsala University, Sweden approved both studies.

Statistics

Data were analysed with the SPSS (version 13.0) and SAS (version 9.1) statistical programme packages. The overall partial non-response proportion (missing data in returned questionnaires) was <0.15% with a specific variable maximum of 2%. Summary statistics such as means, proportions and measures of dispersion were computed using standard parametric methods. Simple differences between groups in continuous data were tested with Student's t-test or analysis of variance, and differences in proportions with the chi-square test. Multiple logistic regression was used for analyses of variables influencing asthma control, which also provided odds ratios and their 95% confidence intervals (CI). Linear regression was used to compute adjusted mean scores. The analysis model, shown in Figure 2, was visualised by means of logistic regression technique. P-values < 0.05 were considered as indicating statistical significance. With the sample size used in this study a difference between the two surveys in controlled asthma with 10% would be statistically significant with a power of 80%.

Results

Characteristics of the study population

Patient characteristics for the two surveys are presented in Table 1. Women were in the majority in both surveys. The total mean age in each respective survey was 32.3 (SD 8.3) and 32.4 years (SD 8.2), with no differences in distribution according to sex and age between the surveys.

Medication

Short-acting β_2-agonists (SABA) as as-needed monotherapy were used by about a quarter of the patients in both surveys (Table 1). The proportion of patients who used inhaled corticosteroids (ICS) without addition of long-acting β_2-agonists (LABA) or leukotriene antagonists (LTRA) had decreased between the first and the second survey – 42.5% and 26.3%, respectively (p<0.001) – while the proportion of patients using ICS and LABA, or ICS and LTRA, or a combination of all three, had increased – 34.2% and 48.2%, respectively (p<0.001). Inhalers with fixed combinations of ICS and LABA were less frequent in 2001 than in 2005 – 11% and 30%, respectively (p<0.001).

Of the patients taking ICS as a single treatment, 54% in the 2001 survey and 46% in the 2005 survey used their medication only periodically. In the sub-group of patients using ICS-only periodically, 69% and 58%, respectively, did not achieve asthma control.

Apart from one patient in the first survey who used LTRA as monotherapy, LTRA was used as an add-on treatment by 5% and 8% in each respective survey.

Asthma control

Approximately 40% of the patients had achieved asthma control in both surveys, with no difference between the two surveys (Table 2). There was no difference in the distribution of the levels of asthma control between the two surveys, either in total or with respect to sex.

In both surveys there was a significant difference in asthma control between women and men, with more frequent uncontrolled asthma among women (p<0.001 in the first and p<0.05 in the second survey). Uncontrolled asthma was also more common among daily smokers versus non-smokers in both the first (50% versus 38%, p<0.01) and second surveys (58% versus 30%, p<0.01).

Half of the patients with combination therapy (separate inhalers or fixed combination) had uncontrolled asthma in both surveys.

Patients with controlled, partly controlled and uncontrolled asthma in the first survey had been on sick leave during the last six months in 8%, 15% and 41% of cases, respectively, (p<0.001) while in the second survey the corresponding figures were 7%, 7% and 39%, respectively (p<0.001). There was no difference in sick leave between the two surveys.

Factors influencing asthma control

Age, sex and smoking had a significant influence on the degree of asthma control (Table 3). The combined effects of age, sex and smoking in both surveys are presented in Figure 2. The proportion of asthma control ranged from 20% to

Table 1. Patient characteristics and asthma medication during the last six months in the first survey, 2001, and in the second survey, 2005. P-values refer to differences between all patients in the first and in the second surveys, respectively.

	Survey 2001				Survey 2005				
	Women		Men		Women		Men		p
	n	mean or %	n	mean or %	n	mean or %	n	mean or %	
N	613	60.6	399	39.4	141	62.9	83	37.1	ns
Age mean		32.1		31.8		32.4		32.9	ns
Daily smokers	122	20.2	40	10.2	22	15.6	4	4.8	ns
Sick leave due to asthma last six months	130	24.3	74	19.5	28	22.2	6	7.8	ns
Rescue medication for asthma symptoms more than twice a week	300	49.7	196	50.3	68	48.2	40	49.4	ns
Night awakening due to asthma last week									<0.05
none	413	67.9	312	79.0	99	70.2	69	84.1	
one night	85	14.0	41	10.4	31	22.0	6	7.3	
more than one night	110	18.1	42	10.6	11	7.8	7	8.5	
Unscheduled visit last six months	180	29.6	78	19.7	34	24.1	10	12.0	ns
Oral steroids last six months	114	18.9	34	8.8	21	15.1	4	4.8	ns
Only SABA as needed	128	21.0	106	26.8	29	20.6	28	33.7	ns
ICS regularly or periodically	265	43.5	162	40.9	36	25.5	23	27.7	<0.001
ICS and LABA regularly or periodically *or* ICS and LTRA, regularly or periodically *or* combination of all three	216	35.5	128	32.3	76	53.9	32	38.6	<0.001

SABA = short-acting β_2-agonist, LABA = long-acting β_2-agonist, ICS = inhaled corticosteroids, LTRA = leukotriene receptor antagonists.

Table 2. Asthma control in relation to asthma treatment in the first survey, 2001, and in the second survey, 2005. P-values refer to differences in asthma control between the two surveys.

	Survey 2001 (n=1,005*)						Survey 2005 (n=224*)						
Asthma medication	Controlled		Partly controlled		Uncontrolled		Controlled		Partly controlled		Uncontrolled		
	n	%	n	%	n	%	n	%	n	%	n	%	p
SABA as needed	148	63.2	38	16.2	48	20.5	36	63.2	14	24.6	7	12.3	ns
ICS regularly or in periods	132	30.9	123	28.8	172	40.3	23	39.0	22	37.3	14	23.7	0.049
ICS and LABA regularly or in periods *or* ICS and LTRA, regularly or in periods *or* combination of all three	88	25.6	78	22.7	178	51.7	31	28.7	24	22.2	53	49.1	ns
Total[1]	368	36.6	239	23.8	398	39.6	90	40.2	60	26.8	74	33.0	ns
Women	205	33.7	130	21.3	274	45.0	53	37.6	33	23.4	55	39.0	ns
Men	163	41.2	109	27.5	124	31.3	37	44.6	27	32.5	19	22.9	ns

SABA = short acting β_2-agonists, ICS = inhaled corticosteroids irrespective of dose, LABA = long-acting β_2-agonists, LTRA = leukotriene receptor antagonists

* The number of patients in the two surveys with information available about medication.

[1] Represents the distribution of asthma control for all patients, women and men in each separate survey

Table 3. The odds ratio (OR) for having controlled asthma compared with partly controlled/uncontrolled asthma adjusted for age, sex, smoking and survey with 95% confidence intervals.

		OR for controlled asthma
Age (increasing age)		0.98 (0.96-0.99)
Sex	male	1.28 (1.01-1.63)
	female	1.0
Daily smoker	no	1.62 (1.14-2.31)
	yes	1.0
Survey	2005	1.16 (0.87-1.58)
	2001	1.0

53%, depending on these factors. In both surveys, young non-smoking men were most likely to have controlled asthma. The likelihood of having uncontrolled asthma was greatest for older, smoking women.

Body mass index (BMI) was higher for patients with uncontrolled asthma than for patients with controlled and partly controlled asthma, (mean (SD) 27.2 (5.8) vs. 25.5 (4.4) kg/m^2 ($p<0.05$)). Data were only available in the 2005 survey.

Uncontrolled asthma was more common among patients with reported allergy to both pollen and pets as compared with allergy to either or no reported allergy at all, 47%, 33%, 26% and 38%, respectively ($p<0.001$), data only available in the first survey.

The distribution of different criteria for evaluating asthma control among patients with partly controlled or uncontrolled asthma is demonstrated in a Venn diagram (Figure 3). Many patients with one or more exacerbation during the last six months also had frequent use of rescue medication or night awakenings during the last week.

Disease severity according to patients

The patients in the second survey also assessed their own disease severity. Figure 4 compares this self-assessment with objective asthma control according to guidelines. Among patients with controlled asthma most patients assessed their asthma as very mild or mild, while 12% considered their asthma as moderate or severe/very severe. Most patients with uncontrolled asthma assessed their disease as moderate or severe/very severe, while 33% assessed their asthma as mild and 6% as very mild.

Twelve per cent of the patients using only SABA as needed, 24% of the patients using ICS, and 50% using a combination of ICS and LABA/LTRA, assessed their asthma as moderate, severe or very severe. There was no difference between men and women.

Discussion

This study, a comparison between two surveys performed in 2001 and 2005, demonstrates that many patients with asthma treated in primary care do not achieve asthma control, and there were no major differences between the

Figure 3. Venn diagram demonstrating the overlap between rescue medication more than twice last week, night awakenings last week and any exacerbation last six months in patients with partly or uncontrolled asthma. The percentage in the venn diagram represents the first survey 2001 (n= 637) / the second survey 2005 (n=134).

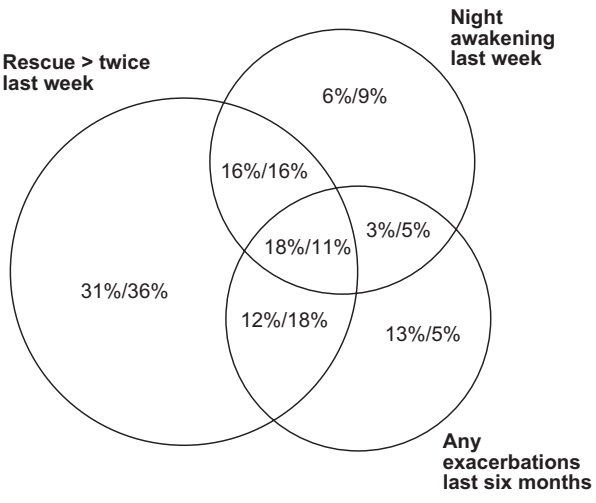
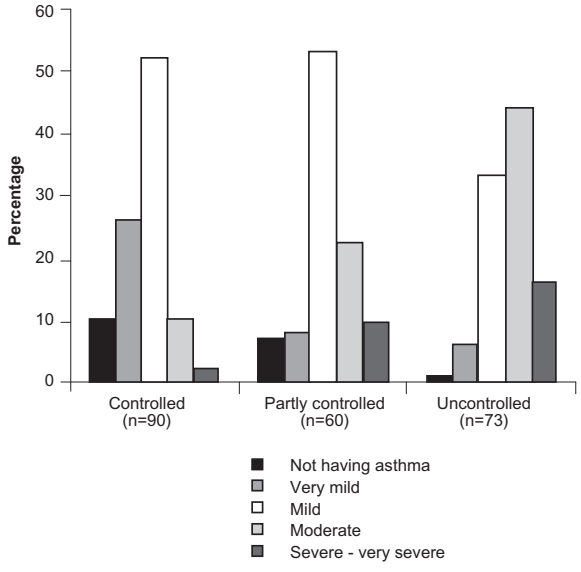


Figure 4. Patient self-assessed disease severity in relation to asthma control according to guidelines (data from the survey 2005).



two surveys. Many patients used their ICS periodically which (probably) was not how it was prescribed. The use of combination treatment had increased during the four years, but without significant improvement in asthma control. There was also a discrepancy between the patients' own assessments of their asthma control and disease control according to guidelines.

The high prevalence of patients without controlled asthma in our study has also been demonstrated in other international studies. Over the last few years many guidelines have highlighted the importance of achieving asthma control, whilst a large number of studies have pointed out the difficulties in achieving this level of control.[2,3,6,7,9] The implementation of new guidelines in primary care is a challenge.[14] Other authors have pointed out the need for effective tools for identifying poor control.[15-18]

More patients were treated with ICS/LABA combination inhalers in 2005 than in 2001. This may be attributable to the change in treatment guidelines, which now recommend adding LABA to ICS instead of increasing the dose of ICS. A change in prescription habits in Sweden towards the use of more fixed combination devices has also been noted.[19] However, there were still a substantial number of patients with uncontrolled asthma in both surveys.

In our study, as well as in other studies,[2] many patients with insufficient control only use SABA as needed, or only ICS. Many of these patients should probably be at a higher treatment level according to current guidelines. Another reason for insufficient control might be lack of adherence to prescribed medication.[20-23]

In our surveys we found that many patients used their ICS periodically, in contrast to treatment guidelines and (probably) in contrast to their doctor's prescription. This conceivable under-treatment might also be a contributory cause of insufficient control. Patients with uncontrolled asthma had been on more sick leave, which is of importance in terms of the economics of public health.

The Venn diagram in this report demonstrates that a high proportion of patients with exacerbations frequently use rescue medication and have night awakenings outside the exacerbation period. This may indicate that past exacerbations have not led to an adjustment in asthma management since many patients still have symptoms and need of rescue medication.

In our surveys, 37% and 40%, respectively, had achieved asthma control. This can be compared to the levels of control achieved with treatment for other chronic diseases in primary care. In a 2001 study of diabetes mellitus patients in primary care in Sweden, 57% achieved target levels of HbA_{1C}.[24] In another study, 55% of the patients treated with statins reached their goal for total cholesterol.[25] It seems more difficult to achieve the goals in asthma treatment. One reason for this difference might be that the goals in asthma treatment are more complex to define and need a structured patient consultation, as compared with diseases where treatment goals are defined in terms of laboratory parameters.

The number of smokers decreased between the two surveys, but more women than men still smoked. This decrease is in accordance with the national trend in Sweden.[26] Smoking has been demonstrated to have a negative influence on the effects of ICS in asthmatics and on the severity of disease.[27,28] This might be one reason why fewer smokers than non-smokers achieved asthma control in our study. Women also achieved asthma control less often, which is in accordance with other studies.[29-31]

There was also a discrepancy between patients' own assessments of disease severity and disease control according to guidelines. Many patients in this study (as well as in other studies[32,33]) perceived their asthma as being mild, in spite of insufficient guideline-defined disease control. On the other hand, there are patients whose asthma is controlled but who judge their own asthma to be moderate or severe. One reason for this discrepancy might be that patients have different treatment goals from those defined in guidelines. Another reason may be that our definitions of control don't take into account all limitations in daily life – limitations which are important to the individual patient when judging his/her own asthma.[34]

There are several strengths in this study. Both surveys included randomly sampled asthma patients from randomly sampled PHCCs in the same region in mid-Sweden. The patients were in the same age group and had made visits to the primary care centres during the last 18 months in both surveys. Both surveys were performed during the winter season, and the questionnaires contained the same questions about asthma control. Furthermore, the response rates in both surveys were satisfactory. In the 2001 survey the non-response telephone follow-up did not reveal any difference between responders and non-responders.[12] No follow-up of the non-responders was performed in the second survey. However, as the survey was carried out with the same design and in the same region as the first survey and there were no differences according to sex or age between responders and non-responders, it is anticipated that the non-responders did not differ from the responders in any crucial manner.

The questionnaire used in these two surveys was constructed some years before the definitions of asthma control were published in the latest GINA guideline[4] and consequently the classification of asthma control in this report is slightly modified in comparison with that used in the GINA guideline. However, in our opinion the definitions used in this

Discussion summary

a) Difficulties in this study

The time interval of four years between the two surveys might be too short to measure any improvements in asthma control.

b) Alternative methodologies

It could have been beneficial to perform a clinical examination when assessing the level of asthma control.

c) New questions arising

How could the implementation of guidelines be improved in primary care?

d) Lessons for clinical practice

Many patients in primary care have insufficient asthma control. Evaluating the degree of asthma control is essential when monitoring individual patients with asthma.

report are still comparable to those in the GINA guideline.

One limitation of this study is that the results were entirely based on patient questionnaires and did not include clinical examinations or lung function tests. However, the majority of general practitioners (GPs) do not normally perform spirometry regularly on asthma patients in order to evaluate asthma control, and therefore the level of control is based only on clinical data in most cases. Another limitation of this study could be that the time interval of four years between our two surveys might be too short to measure any improvements in the management of asthma in primary care.

In Swedish primary care, each patient consulting a physician receives a diagnosis which is listed in a special register at the clinic. The patients selected from these registers, in both surveys, had consulted their GP at least once during the last 18 months. As many patients with intermittent and very mild asthma seldom seek health care, this might be an explanation for the low proportion of patients with good asthma control in this report. Also, those with mild disease might also receive medication without a physician appointment, and might then not be found in the diagnosis register for the selected period.

In spite of treatment recommendations and effective asthma medications, many patients in primary care still have insufficient asthma control. Many factors contribute to the level of control, as has been demonstrated in this study. The importance of evaluating the degree of asthma control when monitoring individual patients cannot be emphasised enough.

Conflict of interest

Björn Ställberg has been paid for lectures and for consulting from AstraZeneca, GlaxoSmithKline, Merck Sharp & Dohme and Schering Plough.
Karin Lisspers has been paid for lectures and for consulting from AstraZeneca, GlaxoSmithKline, Merck Sharp & Dohme and Schering Plough.
Mikael Hasselgren has no conflicts of interest.
Gunnar Johansson has received fees for consulting and for speaking at symposia arranged by AstraZeneca, GlaxoSmithKline, MSD and Schering Plough.
Christer Janson has received research grants from GlaxoSmithKline and has received fees for lectures by AstraZeneca, GlaxoSmithKline, Merck Sharp and Dohme, Boehringer Ingelheim and Pfizer.
Kurt Svärdsudd has no conflicts of interest.

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