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Author(s) : Michèle Belot
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Prevention in the curative sector

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1 Introduction

An old axiom says that an ounce of prevention is worth a pound of cure. Whether this is true or not, there are reasons to believe that prevention does not get enough attention in Dutch health care. Several recent reports (from the RIVM and the ministry of Public Health, Welfare and Sport) point at worrying developments in health status in the Netherlands. Life expectancy stagnates; the position of the Netherlands worsens in comparison to other European countries. The reports suggest that too little attention for prevention may be one of the reasons for these unfavourable developments.

Prevention can help improving health and reducing the probability of getting sick. It does have a favourable effect on the health status of the Dutch population and on the quality of life. The effect on costs of health care is more complicated. Some preventive activities turn out to be very cost-effective and sometimes even cost saving. Even these activities may receive too little attention. However, it is not a given that all forms of prevention save costs in the long run, nor should we demand that of prevention. One of the reasons that prevention does not always lead to lower health care costs is that prevention may improve life expectancy but not all extra years are healthy years. This means that patients need treatment for chronic conditions for a longer period. In such cases the benefit of prevention is not in cost control, but in saved life years or improved quality of life. Given the worries about the health status of the Dutch population¹ and the growing expenditures in the health care sector, it is worth wondering which forms of prevention deserve more attention and which incentives can promote this attention.

Prevention enters all spheres of life. Anything that helps reducing the chances of getting sick can be considered as a form of prevention. The way we live, the food we eat, the number of times we go to the sport school, etc. can help preventing diseases. The environment we live in also plays an important role. A particular form of prevention is the one practiced by health professionals. Examples of this type of preventive care are vaccinations, screening for particular diseases or lifestyle counselling. The expertise and the technologies necessary to provide this type of preventive care are present in the health care sector more than anywhere else.

The health care sector, in particular the curative sector, puts currently a lot of emphasis on cure. Prevention receives relatively little attention. The primary mission of the curative sector is obviously to cure, but prevention belongs explicitly to one of its tasks as well. Some forms of prevention can easily be organised outside the curative sector. However, for other forms it may be optimal to combine cure and prevention in one entity. Doctors have a lot of information about their patients, their medical history, etc. Furthermore, they meet their patients relatively often (Dutch general practitioners see three-quarters of their patients at least once a year). Doctors are in a favourable position to provide adequate and effective preventive care. But at

¹ See for example RIVM (2002).

the same time we know that the incentives in the curative sector are not geared at prevention. This is true for health insurers as well as doctors. Recent changes in the Dutch system of health insurance may worsen the incentives further. Therefore, this paper concentrates on prevention within the health care sector. In the analysis of prevention in the curative sector the emphasis is on the role of the general practitioner (GP).

The ambition of this study is to answer the three following questions:

1. What is the extent of prevention in the curative sector? (Part 2)
2. Is there currently too little prevention in the curative sector? (Part 3)
3. Why does the curative sector fail to provide enough preventive care? (Part 4)

We discuss some policy options that might stimulate prevention in the curative sector. We discuss the experience of other countries and draw lessons for the Netherlands.

2 Current situation

2.1 Types of prevention

The way we live, where we work and live, the people around us, our genetic background, our age, our gender all determine our health. Diseases cannot always be prevented or limited in their expansion, but there are certainly many cases in which one can reduce the risks and consequences of disease.

Kernel (2000) defines three types of prevention. First, primary prevention reduces the probability of getting a disease. Next, secondary prevention limits the damage associated with a disease (by limiting its expansion through identification in an early stage). Finally, tertiary prevention reduces the disabilities associated with chronic illnesses. Because tertiary prevention is close to cure, we will concentrate on the two first forms of prevention.

Primary prevention aims at reducing the risks of contracting a disease. It starts at the level of the individual. There is a lot we can do to prevent diseases. Our lifestyle matters a lot for our health². Recent studies (see RIVM³) have shown that unhealthy habits have dramatic effects on health. By changing their behaviour, people could substantially reduce the risks of some diseases (e.g. heart and lung diseases). There are many organizations involved in primary prevention. They promote a healthy lifestyle; help individuals change their habits, etc. Not

² Asvall EJ, 'Measuring the impact of determinants of health'; WHO, 1998, 50% of sicknesses are due to lifestyle habits, 20% to social factors, 20% are genetically determined and 10% are due to medical circumstances

³ "Tijd voor Gezond Gedrag", 2003

everything is a matter of behaviour or lifestyle, however. The physical and social environment determines the risks of contracting a disease as well. One way of reducing these risks is to protect people from these risks, for example by vaccination against some diseases (polio, diphtheria, tetanus or tropical diseases). Another way is to act on the environment itself. Public authorities play a large role in making the environment safe by imposing norms, controlling hygiene, etc. to guarantee food and water safety for example. The health care sector cannot act on the physical and social environment. For that reason, we will not elaborate further on environmental prevention here.

Secondary prevention aims at reducing the consequences of a disease. The objective is not to avoid the disease, but to limit the damage. Many diseases expand over time. Early tracing of these diseases can help limit their expansion and consequences⁴. The health care sector uses advanced technologies and expertise to identify deficiencies at an early stage.

2.2 Prevention policy

Prevention is part of public policy. Since it concerns all spheres of life, it concerns the entire landscape of public policy. Some departments are obviously more related to disease prevention than others. The Ministry of Public Health, Welfare and Sport (VWS) is clearly the first department involved in disease prevention. Other ministries, such as the Ministry of Water Management (VW), have a close link with disease prevention as well. Next to the national Ministries, local Communities participate directly in prevention activities, for instance through their subsidies to the Local Institutes for Public Health (GGD).

It is not easy to give a good estimate of the scope of prevention. Where does it start, where does it end? The ministry of Health, Welfare and Sport estimates that 4% (1.4 billion Euro) of the total costs of the Dutch health care system is spent on prevention, which seems rather small. The market for prevention is probably larger than the share of public funds indicates, but it is hard to estimate how large it really is.

The government uses several instruments to stimulate disease prevention: Provision of information about health and prevention, subventions to the health care sector and organizations involved in prevention, regulations and laws (discouraging unhealthy lifestyle for example), taxes discouraging unhealthy behavior, subsidies encouraging healthy behavior, etc. Prevention policy directly influences prevention in the curative sector through two channels:

⁴ Not all screening procedures fall under secondary prevention. We consider only the ones which can effectively help reducing the damage. Screening procedures enabling to identify the risks of developing particular diseases (such as genetic screening) do not fall under this category.

1. Exceptional Medical Expenses Act (AWBZ): Finances large-scale preventive programs, some of them involving the curative sector.
2. Public insurance schemes: The government determines what is included in the basic package.

A large share of prevention policy does not involve the curative sector. The government sponsors activities surrounding the provision of preventive care, taking place outside the curative sector. The authorities also give subsidies to specific projects or programs organized at the local level (GGD). Finally, the government invests in research and evaluation of policies (subsidies to research institutes).

Tabel 2.1 Budget Prevention (2004) - mln Euro

Financed by insurance premiums	210.8
National Vaccination Program	49.2
Influenza Vaccination Program	33.8
Screening	67.3
Parent and childcare / diet advice	24.1
Financed directly by the Ministry of Public Health	414.9
Lifestyle	18.3
among what alcohol	4.1
smoking	6.5
overweight / diet	2.0
Screening and tracing of infectious diseases	29.0
among what vaccination hepatitis B	2.3
Nederlands Vaccin Instituut	13.4
Quality and accessibility health care	191.9
Research and evaluation	81.9
Others	93.8

The Exceptional Medical Expenses Act finances preventive activities for specific groups. Some of them are carried out in the curative sector:

- Diet advice for medical reasons
- Influenza vaccination for high-risk groups
- Cervical cancer screening
- Pre- and peri-natal care
- Screening for hereditary hypercholesterolemia

The basic package of the public insurance schemes compensates for preventive care as well, directly or indirectly:

- Visits to the general practitioner and medical specialists

- Diet preparations
- Medication as determined by the Ministry of Public Health, Welfare and Sport. Preventive medication that can only be prescribed by a doctor is in general reimbursed. Some forms of preventive medication are not reimbursed: Those that do not require a prescription (and can be bought directly in drugstores for example) and preventive vaccination of tropical diseases.

Of course, publicly insured people can buy additional insurance on the market. Privately insured people (about one third of the population) buy the entire health insurance package on the market. There is a wide range of insurance packages on the market. They vary from no coverage of prevention at all to a generous coverage of many preventive activities, such as the costs of a diet advice, courses of treatment in specialized centres, medical sport advice, physical exercise program, vaccinations for travelling abroad, etc. Most insurance companies offer basic packages with limited coverage of preventive treatments. The basic packages include sometimes more than the public basic package. For example, many insurance companies cover preventive care for coronary diseases, screening for prostate cancer, vaccination for travelling abroad. The most generous packages include reduction on tuition fees for sport and health centres, reimbursement of lifestyle training and preventive courses, etc. We note that prevention takes often the form of an extra that the market offers at a relatively high price.

Basic principles of the new health care system

Starting from 2006, the rules around the health care insurance system change drastically, allowing for more competition between insurers and between health care providers. The new system is based on the following principles:

- No distinction between public and private insurance schemes. There will be one insurance scheme, which takes over part of the features of both current schemes.
- Compulsory basic insurance package for everyone (comparable to the current public insurance package)
- Compulsory co-payment for this insurance package and the possibility for consumers to choose higher co-payments
- Obligation of acceptance for insurance companies, without price discrimination based on personal characteristics on this basic package
- Consumers are allowed to switch insurer once a year.
- Insurers receive subsidies according to the risk profile of their population (based on objective characteristics such as age, gender and inability to work)
- Insurers are allowed to make profits
- Insurers and health care providers will be allowed to negotiate quantities and prices for some forms of health care bilaterally.

One important aspect of the market for health care is the rewarding scheme for general practitioners. In the old system, there were two rewarding schemes: fee for service for privately insured patients and capitation for publicly insured patients. GP's received an additional compensation for some specific preventive activities (influenza and cervical screening), which form the large-scale prevention programs. In the new insurance system GP's have a uniform payment system for all their patients: a combination of capitation and fee for service.

2.3 Prevention in the curative sector

The curative sector consists of general practitioners (GP), medical specialists, hospital care, dentists, midwives, paramedics and ambulance transport. The primary mission of the curative sector is by definition to cure. This means identifying symptoms, establishing a diagnosis, treating the disease and offering nursing care. Prevention is one of the other missions of the curative sector. We should note that prevention and cure are relatively separate from each other in the Netherlands. The curative sector is by definition in charge of cure, and Local Institutes of Public Health (GGD) are mainly in charge of prevention. The curative sector does some prevention as well, but many activities take place outside the curative sector (e.g. children immunization, etc.).

There are two types of preventive activities within the curative sector: Programmatic prevention (systematic) and casuistic prevention (non-systematic).

2.3.1 Programmatic prevention

Programmatic prevention consists of a large-scale and systematic provision of preventive care to particular groups of patients. There are several preventive activities organized in a systematic way (programs). They are directly financed by the AWBZ (Exceptional Medical Expenses Act). These programs define target groups based on objective characteristics (such as age, gender or medical status). Two programs are currently implemented in the curative sector, by the general practitioner (since 1992).

- **Vaccination against influenza** for high-risk groups: The rate of coverage of the program has increased from 28% in 1991 to 76% in 1997 (Tacken et al. 2000).
- **Cervical cancer screening**: Every five years, for women between 30 and 60. Studies show that over the period 1995-97, 81% of women who were invited for such a test responded positively.

The umbrella organizations of GP's (LHV and NHG) favored the introduction of these programs, which were proven efficient and feasible. The general practice is particularly appropriate for providing programmatic preventive care as traditionally everyone in the Netherlands is registered in a general practice. Target groups can be identified easily. The general practitioner receives a specific compensation for these preventive activities. Note that there exist other prevention programs, taking place outside the curative sector. Local public health centres carry out the program for children immunization and regional organizations are in charge of screening women (between 50 and 75) every two years for breast cancer.

2.3.2 Casuistic prevention

Casuistic prevention is based on an indication during a personal consultation, at the discretion of the general practitioner. The umbrella organization NHG, who defines guidelines for 78 diseases or health disorders, recommends prevention in many cases. Of course, these are guidelines and not rules that have to be followed. The guidelines of the NHG are followed on average in 74% of cases (Schellevis et al., 2004). We find specific preventive recommendations in guidelines for the three large-scale programs, but also for problematic alcohol consumption, hypertension, cholesterol, contraception, insomnia, osteoporosis, HIV, smoking, sexually transmitted diseases, contagious diseases and pregnancy.

It is hard to give an estimate of the extent of casuistic prevention in the curative sector and in the general practice in particular. According to Cardol et al (2004) the theory is that Dutch GP's integrate prevention in the daily treatment of their patients, but this is not carried out in a systematic way. In the following examples of preventive activities in the general practice are given.

2.3.2.1 Primary prevention

- **Lifestyle advice:** There is little known about how much advice patients get from their doctors. Lifestyle advice comes back in guidelines for many diseases. According to these guidelines, lifestyle advice should be preferred to other preventive treatments such as preventive medication. Patients often need more than a bare advice to make the necessary changes in their lifestyle. The doctor can help and guide the patients in their lifestyle changes. One example of this type of intervention is the Minimum Intervention Strategy (MIS) program designed for smokers who intend to quit smoking. The MIS consists of a Health Counselling Model including successive steps stimulating smokers to quit. The MIS is applied at different levels in the curative sector (general practitioner, nursing (for pregnant women), cardiology and lung specialist). Evaluation studies were positive about the effects of these programs. The rate of smokers in the treated group significantly decreased in comparison with a control-group.

Drossaert et al. (1999) found that smoking cessation after 6 months was 8% in the intervention group and 1% in the control group. Despite these positive results, the implementation in practice remains limited. Drossaert estimate that 30% of the general practitioners implemented the MIS. Evaluation studies conclude that the implementation remains limited because doctors dislike intruding in patients' lives and are not sufficiently convinced of the effectiveness of the intervention. GP's perceive also a lack of time to counsel all smokers (Frijling and Drenthen, 2000)

- **Preconception care:** Preconception care belongs to this category as well. Research shows that the habits and lifestyle of mothers have a significant effect on the health of newborns. According to a survey among general practitioners of one region (Nijmegen), general practitioners recognize preconception care as one of their tasks but do not feel sufficiently informed and qualified to provide adequate preconception care.
- **Breast-feeding:** Research showed that breast-feeding is beneficial to mothers and newborn babies. 93% of maternity care services in hospitals are aware of the recommendations by the World Health Organization and UNICEF with that respect.

2.3.2.2 Secondary prevention

Secondary prevention helps to identify health problems at an early stage. Of course, identifying a disease or a disorder is a primary task of the curative sector. In that sense, all efforts of the general practitioner and other specialists in that direction can fall under this category. However, we are particularly interested in those cases where the timing of the diagnosis matters, i.e. when diseases expand over time. The curative sector is involved on a large scale in secondary prevention, but few activities are organized systematically.

1. **Prenatal care** (executed by the GP's, the midwife or the gynecologist): Blood analysis for pregnant women (pre-natal screening), screening for blood group, rhesus-D factor, hepatitis B, syphilis, HIV and other antibodies. Prenatal screening (amniocentesis) is another form of screening, aimed at identifying deficiencies at an early stage (such as the Down Syndrome). In the current state of the law, this test should be offered to women older than 36, at the occasion of their first pregnancy control test. In 1998, 45% of the target group took the screening test (Down Syndrome). Since these tests are performed on a voluntary basis, it is hard to estimate to what extent the coverage rate reflects the preferences of the population or the behaviour of health professionals.
2. **Monitoring:** General practitioners or medical specialists can monitor indicators of health: blood pressure, cholesterol, glucose. Two recent programs (CARPCE, HVZ project Preventie maatwerk) have been implemented to improve the extent of blood pressure controls by the general practitioner. These programs were targeted at patients with high risks of cardiovascular

diseases. Despite positive evaluations in terms of efficiency, these programs have been suspended because of the time burden they represented for general practitioners.

3. **Others:** General check-ups, blood and urine tests are other examples of secondary preventive activities in the general practice. The general check-up is between primary and secondary prevention. Blood and urine tests can also be relatively untargeted and investigate many diseases at the same time. Radiography could also fall in this category. Some tests target specific diseases or groups of patients, such as tests of sexually transmitted diseases, hereditary or genetically determined deficiencies or prostate-cancer. These are not implemented in a systematic way.

Sometimes, GP's benefit from assistance (nurses helping doctors in general practice for example). Regional organizations of GPs (Districts HuisartsenVerenigingen (DHV)) have set up a program of support of programmed prevention activities within the general practice. The program provides information on how to perform preventive care. Practice consultants visit the GP and their assistants and advise them on how to organize preventive care within the practice. Recently, the program introduced medical assistants, who take over part of the preventive work of GP. So far, their intervention has been limited to chronic diseases such as asthma and diabetes. The ambition of the program is to introduce medical assistants in 80% of the general practices by 2004.

Note that personal contact is not the only way GP can reach their patients. Leaflets, handbooks, personal letters, internet sites are all alternative channels to reach patients. The umbrella organization NHG provides standardized brochures concerning many diseases and disorders. These folders are widely spread in all general practices.

2.3.3 Prevention of health deterioration

We said before that the health care sector could not do much about the safety of the environment we live in. There is one exception, however. The health care sector is part of the environment itself. An obvious form of primary prevention one should find in the curative sector is prevention of health deterioration or infection in the curative sector itself. Patients entering the curative sector generally get in touch with unhealthy patients, and are probably more fragile themselves. Therefore, preventing the spread of infectious or other diseases is an obvious preventive task of the curative sector. The problem concerns probably more hospitals than individual practices. According to the Dutch Society of Infection Prevention and Control in the health care setting (VHIG), 10% of patients get an infection during a stay or treatment at the hospital. Since 1981, there exists a working group for infection prevention (WIP), which provides guidelines for infection prevention in the health care sector. A recent project (PREZIES, 1996-2001) monitored the appearance of infectious diseases in several hospitals.

The objective was to identify which factors determine the appearance of infectious diseases. They found that the participation to this monitoring program lead to a significant fall in the risk of contracting an infectious disease at the hospital (the risk fell on average by 50% in the last monitoring year compared to five years earlier).

2.4 International comparisons

2.4.1 Overview of prevention policies in European countries (RIVM)

The RIVM collected information about prevention policies in European countries. We first present a general overview of the position of countries with respect to their prevention policies (whether those are weak or strong in terms of actions undertaken). Weak policies are not necessarily suboptimal, in particular if cost-effective prevention policies have not been identified yet (e.g. prostate cancer screening).

Generally, we observe some convergence in prevention policies. Countries follow more and more guidelines provided by international institutions. For example, the European Commission gave specific recommendations with respect to food consumption (Eurodiet project), and so did the World Health Organization.

The position of the Netherlands in terms of prevention policies is relatively strong compared to other countries. However, the degree of intervention remains on average limited to prevention programs that have proven to be very cost-effective.

Tabel 2.2 Overview of general prevention policies in Europe

	Weak policies	Strong policies	Position of the Netherlands
Smoking		Most European countries	Netherlands was relatively late in the implementation of some regulations (smoking in public places,
Alcohol consumption	Portugal, Greece (no limitation on age)	Scandinavian countries, Netherlands, Belgium, UK and Ireland (limitation on age, location, taxes)	
Food consumption	Most European countries (no programs, no taxes or subsidies) Some countries have developed guidelines for the GP (France, Germany, the Netherlands, Spain, UK)		
Sexual Behaviour	Most European countries have a program of information for young people		
Hypertension screening	No systematic screening in European countries		
Cholesterol screening + reduction	Most countries have guidelines for GP		The Dutch guidelines are slightly more precise than the European guidelines
Vaccination programs	Greece has the lowest vaccination percentages	Most European countries have vaccination programs for polio, rubella and influenza	The Netherlands have relatively high vaccination percentages, in particular with respect to influenza (that is organized in the general practice)
Prenatal screening en hepatitis B	Scandinavian countries do not have prenatal screening programs	Most European countries have prenatal screening programs for pregnant women	The Netherlands, Scandinavian countries, Ireland and the UK do not vaccinate systematically against Hepatitis B (because of the low incidence)
Screening Breast Cancer		Most European countries have a breast cancer screening program	The Netherlands have one of the highest coverage rates (because of the centralized organization)
Screening Cervical Cancer		Most European countries have a cervix cancer screening program. Countries vary in terms of frequency and ages at which the test is offered	The Netherlands and Finland have a relatively low frequency of screening (higher frequency is not cost-effective)
Screening prostate cancer	Most countries do not have a systematic screening program		

2.4.2 The role of the general practitioner in prevention: International comparison

We focus now on prevention activities implemented in the general practice.

Boerma [2003] presents an international comparison of the involvement of the general practitioner in various prevention activities. We reproduce one table (Table 5.2). The Netherlands score relatively low with respect to hypertension and cholesterol screening. We note that some preventive measures receive little attention in all countries, such as health education. Finally, the United Kingdom and Portugal score very high on all measures.

Tabel 2.3 The involvement of GPs in five measures of preventive care (source: Boerma (2003), Table 2.3, page 51)

Service	Mean	Seven highest (H) and lowest (L) national values
Hypertension screening	78%	H: France (99), Portugal (94), United Kingdom (93), Belgium (92), Latvia (92), Poland (92) L: Netherlands (37) , Sweden (40), Norway (46), Finland (54), Turkey (55), Iceland (60), Croatia (65)
Cholesterol screening	38%	H: Spain (80), Germany (79), Israel (73), Austria (61), United Kingdom (58), Italy (54), Switzerland (52) L: Turkey (9), Netherlands (14) , Romania (15), Estonia (22), Latvia (24), Croatia (26), Luxembourg (26)
Cervical cancer screening	48%	H: Denmark (99), Netherlands (99) , United Kingdom (98), Portugal (90), Norway (81), Latvia (78), Italy (77) L: Czech Republic (0), Hungary (2), Croatia (4), Slovenia (5), Turkey (7), Spain (19), Greece (25)
Childhood surveillance and immunization (range 0-2)	1.3	H: Iceland (2.0), Denmark (1.9), France (1.9), Portugal (1.9), Austria (1.8), Sweden (1.8), Switzerland (1.7), United Kingdom (1.7) L: Czech Republic (0.1), Lithuania (0.4), Italy (0.6), Hungary (0.6), Latvia (0.6), Slovenia (0.7), Bulgaria (0.8)
Health education about smoking, alcohol and diet (range 0-3)	0.33	H: Portugal (1.1), Romania (0.9), United Kingdom (0.7), Germany (0.6), Hungary (0.6), Bulgaria (0.5), Norway (0.5) L: Czech Republic (0.1), Latvia (0.1), Luxembourg (0.1), Belgium (0.1), Denmark (0.1), Italy (0.2), Spain (0.2)

The international experience shows that prevention receives relatively little attention in most developed countries. Programs are implemented for very cost-effective preventive measures only.

2.5 Conclusion

The curative sector in the Netherlands has an active role in prevention, but only few preventive activities are organized and coordinated on a large scale. Many actors involved show some reserve with respect to preventive care. The public budget for prevention is small in comparison to the one allocated to cure and care. Private insurers seem to include prevention as an extra in their insurance packages. Professional guidelines for taking efficient preventive action exist, but

do not always seem to be implemented. Other activities seem to receive priority over prevention. This seems to suggest that prevention should receive more priority. The next question is whether it is indeed socially desirable to stimulate prevention in the curative sector. What do we gain? What do we lose?

3 Costs and effectiveness of prevention in the curative sector

3.1 Introduction

“An ounce of prevention is worth a pound of cure”, says the old axiom. The axiom suggests that prevention is much cheaper than cure. Given that resources are limited, we should allocate them between prevention and cure in an optimal way. We develop the arguments guiding the choice between prevention and cure, and between prevention in the curative sector and other forms of prevention (why and when should we carry out prevention in the curative sector?) Then we discuss the results and conclusions of studies evaluating quantitatively the values of different preventive activities. The chapter ends with a conclusion.

3.2 Prevention vs. cure

Prevention and cure both aim at improving health, but differ in essential characteristics. What are the essential differences between prevention and cure? What are the advantages of prevention compared to cure? We compare their effectiveness and their costs.

1. **Benefits**
2. **Targeting:** Cure and secondary prevention are usually targeted at one particular disease, while some preventive measures (especially primary preventive measures) tackle several problems at the same time. For instance, adopting a healthy lifestyle reduces the probability of many diseases, such as coronary diseases, different types of cancer, etc.
3. **Knowledge:** Prevention and cure are two different strategies, requiring different knowledge. The state of knowledge in medicine partly determines the success of an intervention. It may well be the case that doctors ignore the factors causing a disease but are able to cure it. Alternatively, there are diseases medicine cannot cure but can help preventing. The relative state of knowledge in prevention and cure will therefore determine their relative effectiveness. Many studies (see for example Drenthen (1997)) mention that physicians, and general practitioners in particular, think they lack information and skills in order to provide preventive care. Cure receives currently more attention in the educational programs than prevention. Cost-effective preventive measures may therefore not necessarily be feasible in the general practice

without additional training. Hiddink et al [1997] find that primary care practitioners judge themselves to lack skills in treating overweight and even coronary heart disease.

4. **Medical effectiveness:** Knowledge is not the only determinant of a success of a medical intervention. It depends on other factors as well, such as the patient's attitude or, simply, luck. One could argue that the influence of these "other factors" is larger in some forms of prevention than in cure. It is probably harder to change an unhealthy habit than lay down on an operation table, or take medicines.
5. **Interdependence prevention and cure:** Secondary prevention is effective only if there is an appropriate treatment. For instance, breast cancer screening is only effective if it is possible to treat it or, at least, limit its development. On the other hand, primary prevention becomes particularly attractive when there is no cure, since it reduces the probability of getting the disease.
6. **Externalities:** Primary prevention has probably larger positive externalities on the rest of the society than secondary prevention and cure. Think for example of contagious diseases. Vaccinating individuals benefits the rest of society. Of course, screening and curing contagious diseases have benefits on the rest of society as well, but preventing the disease from occurring probably even more.
7. **Costs**
 - a. **Non-financial costs:** A treatment rarely fully compensates for the pain, trouble, and costs of not having the disease at all. There are non-financial costs of diseases that no insurance could ever compensate for. In that sense, prevention is attractive. Prevention has non-financial costs as well, however, such as anxiety while waiting for the results of a screening test.
 - b. **Direct financial costs:** Both treatment and prevention involve costs. An important difference is that prevention is provided to people who do not necessarily need it (healthy people), while a treatment is limited to the ones who are actually sick. In that sense, there is a "waste" in prevention. We should therefore not compare the costs of administering preventive care to one person to the costs of curing a disease but weight these costs by the probability of actually getting the disease. If a disease is very rare, it could be preferable to treat only the ones who actually develop the disease rather than provide prevention on a wide scale. A second important point is that the costs of prevention per individual treated are often much smaller than the costs of cure. These two aspects determine the total direct financial costs of cure and prevention.
 - c. **Discount rate**

In order to evaluate the cost-effectiveness of an intervention, we need to attribute a weight to future outcomes. In the case of prevention versus cure, these weights play a crucial role, as cure

has more immediate benefits than prevention (in particular, primary prevention). *Ceteris paribus*, a high discount factor increases the relative value of cure in economic evaluations.

3.3 Prevention in the curative sector vs. elsewhere

Who should be in charge of prevention? Can we separate prevention and cure? We now discuss the specificities of prevention in the curative sector in comparison with other forms of prevention.

Effectiveness

One could argue that prevention in the curative sector is more effective, as it gathers essential ingredients for the adequate provision of preventive care:

1. **Expertise:** We mentioned before that knowledge is a crucial determinant of success of a medical intervention. All practitioners dispose of medical expertise, which makes them particularly qualified to provide preventive care. However, the expertise about health and treatments is not necessarily better in the curative sector than in other health sectors.
2. **Status:** Because of their expertise and reputation, health professionals are in a good position to influence the patient's decisions. For example, a European study [Almeida et al. 1997] concludes that the most trusted sources of information with respect to nutrition were health professionals in almost all countries (91% trusting the information), in comparison with other sources of information (media, food packages, relatives, ...).
3. **Targeting:** Everyone in the Netherlands is registered at a general practitioner. The patients' files include a lot of information about their health status and personal characteristics. It is therefore relatively easy to reach specific groups, i.e. to reduce the waste of prevention. The general practitioner could call up groups who are more likely to develop a particular disease for a preventive exam. This corresponds to the so-called *programmatic prevention*.
4. **Tailor-made intervention:** Given all the information general practitioners have about their patients, they are in a good position to provide tailor-made advice or intervention. A media campaign clearly cannot consider all individual differences and will therefore be less adequate. For example, Brug (Hans Brug, EUR, European Journal of Clinical Nutrition, May 1999, Volume 53, Supplement 2) has shown that computer-tailored nutrition education was superior to general education (in terms of changes in fat percentages).
5. **Directed advice:** One difficulty with prevention is that it usually requires the patient to cooperate. For instance, a lifestyle advice will not have much effect unless the patient changes his behavior accordingly. The expertise of practitioners and the personal character of the advice could help in that respect. Patients are likely to attribute more weight to a personal advice from their doctor than to a general recommendation from a media campaign. The RIVM notes that

campaigns tend to increase knowledge and information about health and diseases but are not very effective at changing behavior. Practitioners seem to be more successful in stimulating lifestyle changes. However, the evidence, based on international studies, is mixed (see for example Ashenden, Silagy and Weller (Family Practice, 1997))

6. **Frequency of contacts:** Practitioners in the curative sector have frequent contacts with their patients. According to the CBS⁵, 75.4% of the Dutch population visits the general practitioner at least once a year (data covering the period 1995-1999). This means that general practitioners have the opportunity to evaluate the health status of their patients and provide them advice, which can go further than what the patient came for.
7. **Timing:** As we said before, the primary mission of the curative sector is to cure. The curative sector mainly interacts with sick people. We may wonder whether it is not too late for prevention. We have two answers to that. First, we mentioned that doctors can contact their patients themselves. Second, doctors could talk with their patients about other problems than the ones they came for. The consultation is a good opportunity for this type of unasked advice.
8. **Costs**

Prevention in the curative sector requires a personal contact. In comparison with media campaigns reaching many people at once, prevention in the curative sector is relatively costly.

3.4 Economic evaluation of prevention

We have discussed the specificities of prevention, and in particular, of prevention in the curative sector. So far, we have presented qualitative arguments. Economic analysis has developed some tools to evaluate and compare different alternatives. Evaluation measures summarize the expected benefits and costs of an intervention. Benefits are expressed in monetary terms (as in a cost-benefit analysis) or in non-monetary terms, e.g. in years of life saved. The first approach requires attributing a monetary value to life and health, which imposes a normative judgement. The literature usually prefers measures that express benefits in non-monetary terms. Common measures in health intervention evaluation are cost-effectiveness analysis, cost-utility analysis and cost-minimization analysis.

Cost-effectiveness analysis derives the incremental costs associated with a particular benefit (e.g. one year of life) in reference to an alternative. For example, cost-effectiveness analysis in medicine reports the costs of one year of life saved thanks to an adequate screening in comparison to the alternative of no intervention.

Cost-utility analysis is a particular form of cost-effectiveness analysis. Benefits are measured in terms of *quality-adjusted life years*. The idea is that a year of healthy life is worth more than a

⁵ Statistics Netherlands

year of unhealthy life. The measure gives different weights to the length of different health status and adjusts the measure of years of life correspondingly.

Finally, cost-minimization analysis evaluates the costs of various alternatives, which have similar implications.

There are thousands of studies evaluating specific preventive and curative treatments. Recently, there have been several efforts in reviewing information and results. Tengs et al. (1995) were among the first in reviewing cost-effectiveness measures for 587 life-saving interventions, among which 310 were medical. The Harvard Center for Risk Analysis proposes a database including cost-utility measures for hundreds of different treatments, sorted according to the disease they tackle. The National Health Service (UK) has also built a database of economic evaluation analyses, making it possible to search among a large number of studies on specific health interventions. The Office of Health Economics (UK) did a similar effort of gathering references on cost-effectiveness analysis. As far as the Netherlands is concerned, the RIVM (2003) recently reviewed the literature on cost-effectiveness and ranked health interventions according to their cost-effectiveness. In a general report on health and prevention, the RIVM also includes a table reporting important findings in the literature on cost-effectiveness (see p. 133 of the report “gezondheid op koers, Volksgezondheid Toekomst Verkenning, 2003). Finally, McGinnis (2003) presents an overview of cost-effectiveness of several prevention activities in the US (See Annex, Figure 7.1).

The authors of these review studies insist on the difficulty of comparing results of different evaluation studies. Benefits and costs can include different things and be calculated in different ways. One should therefore remain very careful when interpreting these results. In particular, the choice of the alternative intervention is crucial. Indeed, one can intervene to reduce the probability of getting the disease or to reduce the spread of a disease. Doctors could intervene at any stage in the process, and this would define each time another type of intervention with specific costs and benefits. Screening for example can take place every two, three, or more years, and other costs and benefits are associated with each choice.

Keeping this in mind, we can at least make some general comments about these measures of cost-effectiveness.

First, prevention can be much more cost-effective than cure. Especially when targeted at groups with high risks, prevention can be substantially more cost-effective. The three large-scale programs implemented in the Netherlands (influenza, breast-cancer screening and cervix-screening) are good examples of cost-effective preventive measures.

Second, prevention is not always cost-effective. Some preventive measures do not seem to make sense when applied to certain groups, for example low-risk groups. For example, the cost-effectiveness of breast cancer screening drops substantially when targeted at young women.

Third, prevention in the curative sector deserves to be stimulated in the Netherlands. Several preventive measures with a favourable cost-effectiveness are currently not organized in a systematic way. The current cost-effectiveness threshold to carry out prevention on a large scale seems too high.

Obviously, the studies mentioned here provide much more information and details than we can report here. The objective of this section is to give a flavour of the results presented in these studies and derive conclusions about the current mix between cure and prevention in the Netherlands.

Based on the studies mentioned before, we conclude that the following measures should receive attention in the medical arena:

Immunization

- vaccines (childhood, influenza)
- Pneumonia vaccination for people age 65+
- folic acid consumption for pregnant women
- Stimulation of breast feeding

Screening and early intervention:

- Congenital hypothyroidism screening in newborns
- prenatal screening
- Syphilis screening of pregnant women
- colorectal screening (annual stool guaiac colon cancer screening for people age 55+)
- breast-cancer screening among women from 50 to 69
- hypertension screening among all persons
- Chlamydia screening and treatment for young women between 15 and 24.
- Screen for vision impairment among adults aged ≥ 65
- Intensive blood pressure controls for diabetes' patients.
- Intensive glucose control for diabetes' patients
- Voluntary (vs. limited) screening for HIV in female drug users and sex partners
- Cervical screening among sexually active women ≥ 18

Counseling

1. Health counselling to adolescents : tobacco, alcohol, Sexually Transmittable Diseases risk

2. Smoking cessation advice (Feenstra et al.(2003) conclude that all intervention strategies within the medical practice are very cost-effective, the H-MIS being the most cost-effective. Medical advice is found to be much more cost-effective than telephone counselling as implemented by the private foundation STIVORO)

Note that the current prevention programs are estimated to be very cost-effective. For a more detailed description of the measures and of their respective cost-effectiveness, we refer to the various overview studies.

3.5 Conclusion

This section discussed the specificities of prevention in the curative sector in comparison to the two alternatives, i.e. cure and other forms of prevention. Prevention seems more attractive than cure in some cases, in particular when targeted at some groups of people. We identified several important arguments in favour of preventive activities within the curative sector. The combination of expertise and information about the patients makes the curative sector particularly qualified to provide preventive care.

Studies on the cost-effectiveness of medical treatments show that prevention is sometimes much more cost-effective than cure. The programs currently implemented are among the most cost-effective. More interventions would deserve to be implemented, however.

4 The market for preventive care in the curative sector

In section 3 we concluded that there is too little prevention in the curative sector. The logical question following this observation is: Where does the current health care market fail?⁶ To answer this question, we first need to define the market for prevention, describe the rules of functioning in the Netherlands and, finally, analyze the market structure and its imperfections.

4.1 Definition of the market

The market for prevention is complex. As we said before, the supply of prevention consists of many different organizations, and the curative sector is only one of them. Even the curative sector consists of a set of different actors who present different characteristics. A hospital is different from a general practice; a diet counsellor is different from a nurse or a specialist, etc. In the Netherlands, the general practitioner probably plays a dominant role in the provision of preventive care in the curative sector. He is the one who can call up patients for a test or

⁶ The health care market in the Netherlands is not a textbook market. It is heavily regulated by the government as in many other countries.

vaccination, and he is the one who refers patients to other practitioners. We will therefore focus on the general practice, and on the type of preventive care provided there. We identify this type of preventive care as a distinct product. The type of prevention provided in the general practice is different from media campaigns or counselling one can get from several foundations. It requires specific knowledge, expertise, information and technologies, which are only present there. For the remaining of the section, we limit ourselves to this particular product: Prevention as provided in the general practice⁷. The demand side consists simply of the population.

The market for health care and for prevention in particular involves third-party payers. They pay part of the health care goods individuals buy, including prevention goods. We have seen that at the moment insurance companies have a limited role in prevention. This may seem rather counter-intuitive, as they are the ones paying for treatments once individuals become sick. It is easier to understand when we realise that the benefits of prevention are in the future and that prevention does not have to be cost-saving over a lifetime, as we argued in the introduction.

In the following we describe the structure of incentives for all actors on the market. In 2.2 we presented the basic principles of the new health care system that is introduced in 2006.

4.2 Market failures

We identified in the previous section a series of interventions that are very cost-effective and would deserve to be implemented in a systematic way in the curative sector. We now investigate why the current system fails to provide these interventions.

4.2.1 Asymmetry of information

The health care market involves multiple agency relationships between insurance companies, doctors and patients. Insurance companies and patients cannot monitor perfectly the intervention of physicians. They cannot evaluate whether the intervention was necessary and cannot establish the effect of the intervention. Doctors could therefore provide a suboptimal level of care. Some preventive activities are defined around a series of observable aspects such as age, gender, etc. and could be the object of a contract between the principal and the agent. Other preventive activities (casuistic prevention) are based on private information of the GP's. The GP observes particular prevention needs during a consultation. For example, he can notice that the patient's weight is relatively high, etc. It is much harder to establish a contract for these preventive activities.

⁷ The results are applicable to other forms of prevention in the curative sector, but are more complex to model given the interactions between the general practitioner and the other specialists. Pita Barros and Martinez-Giralt [2001, mimeo] show how different organizational settings [in particular, the degree of vertical integration in the medical practice] result in different incentives for prevention. They argue that adequate rewarding schemes can help achieving the social optimum.

Asymmetric information between the physician and the principal (the patient or society) is a problem if the objectives of the physician and the principal are different. There is a wide literature on the objectives of physicians (see McGuire, 2000). Physicians face a set of incentives (financial and non-financial) that could lead them to use their favourable position in terms of information and provide care that is suboptimal from the point of view of society.

A first branch in the literature considers the physician as an individual, maximizing a utility function subject to a budget and time constraint. The utility function usually includes consumption and leisure, but sometimes includes other aspects, such as the health of patients, etc. It is likely that physicians are influenced by the interests of their patients as they see them, but they are not complete professional agents for their patients (Mot, 2002). Physicians may prefer prevention to cure for financial reasons (where prevention is not reimbursed but cure is) or for several non-financial reasons (reputation, distortion of the patient-doctor relationship, etc.).

1. **Distortion of the patient-doctor relationship:** Cure applies to unhealthy patients, prevention to healthy patients (primary prevention) or patients who ignore they are sick (secondary prevention). Telling bad news to someone who thought she was healthy is a difficult thing to do. Doctors may be reluctant to be patronizing. A survey among Dutch general practitioners put the problem in perspective, though. It shows that 8.5% of the doctors think that they should NOT give lifestyle advice unless asked for, while 19.2% of the patients think that it is indeed inappropriate (source: NIVEL).
2. **Reputation:** The doctor-patient relationship is a long-term relationship (repeated game), where the reputation of doctors plays an important role. Reputation consists of the subjective evaluation of the doctor's qualities by the patients. Given that prevention is delivered to healthy patients, it is harder to evaluate to what extent the intervention of the doctor helped improving the health status of patients. Reputation may be easier to build with successful curative interventions.
3. **Information and beliefs of the general practitioner:** GP's seem to underestimate the effectiveness of some preventive treatments. Lynch (1994) argues for example that GP's perceptions about effectiveness can partly explain why they adopted childhood immunization more easily than other treatments, such as cervical cancer.

A second branch in the literature models the physician as a firm, maximizing profit, focusing on the role of financial rewards on the behavior of physicians. Financial rewards determine

incentives for cure and prevention. This relates to the literature looking at the role of financial rewards in shaping practice patterns.

For example, Jelovac, analyzes theoretically the effects of different rewarding schemes on the probability of providing an appropriate curative treatment. Adams (2001) shows that Medicaid preventive fees in the US significantly increase the likelihood of providing preventive care. Gruber and Owings (1996) find empirical evidence (based on US data) of effects of financial incentives on caesarean section delivery. They show that the number of caesarean section deliveries increased relatively more in states where fertility rates decreased most (and thereby in states where income prospects for gynaecologists worsened the most).

4.2.2 Externalities

Health has external effects on the rest of the society. Many diseases are contagious or have some negative effects on other individuals. For example, a vaccination for influenza helps protecting other people from infection. Similarly, prevention of smoking behaviour has positive external effects on other people in the direct environment. Patients, doctors and insurance companies are too small to take these external effects into account.

Summarizing, the set of beliefs and non-financial rewards associated with cure and prevention seems to favour cure and to discourage prevention. Preventive care is therefore likely to be sub-optimal. Moreover, even if they had the right information and beliefs, GP's are too small to internalize the externality of primary prevention on the rest of society. We now develop a simple model capturing the essential differences between prevention and cure, and show how financial rewarding schemes can influence the provision of preventive care.

4.3 A simple model

We start with a simple model where general practitioners determine the treatment (prevention and cure) they will provide to their patients. We rule out possibilities of over or under-medication, which are specific problems attached to curative treatments in general and are not directly relevant for the issue here. We allow for the possibility of suboptimal behaviour of the general practitioner however (from the societal point of view), translating into a sub-optimal distribution of efforts between preventive activities and cure.

Suppose individuals live for two periods. In the first period they are healthy, in the second period, they become sick with a probability p . In case of sickness, the individual receives the appropriate curative treatment. The second period begins after realization of the health status

(sick or healthy) but before the diagnosis. Between the two periods, patients can switch insurance companies.

Individual utility depends on health only: $u=u(h)$, where $h=H,S$ ($H = healthy, S = sick$).

In case of sickness, patients receive a treatment but incur a disutility. The utility in case of sickness $u(S) = u(H) - d$, where d measures the disutility associated with having been sick. Even if the treatment is perfectly effective, we assume that patients always incur a disutility when they become sick. In that sense, prevention can help reducing the expected disutility in the second period.

A second difference between prevention and cure is that prevention is provided at the own initiative of the general practitioner while cure is provided in all cases of sickness. This assumption is strong, in reality, the general practitioner has some power on the treatment decision and patients could also visit the general practitioner at their own initiative for preventive activities. What matters here is that there is an asymmetry between cure and prevention. Patients come more easily for cure than for prevention. General practitioners are more committed to treat their patients if it has been established that they are sick. The easiest way to model this is to introduce this strong assumption. The GP determines whether to provide prevention or not. Both types of prevention lead to a reduction of the expected costs of cure. Primary prevention reduces the probability of sickness and secondary prevention reduces the costs of the treatment in case of sickness.

We start with a simple model, considering primary prevention only. We normalize the population of patients attached to one general practice to 1. Primary prevention reduces the probability of being sick by a factor α . We assume that the costs of providing prevention increase with the number of patients treated: $c_1(n_1)$ with n_1 being the number of patients (or the share in the population) receiving primary prevention and $c'_1(n_1) > 0, c''_1(n_1) > 0$. For example, the cost function $c_1(n_1)$ could take the following form:

$$c_1(n_1) = an_1 + \frac{b^2}{2}n_1,$$

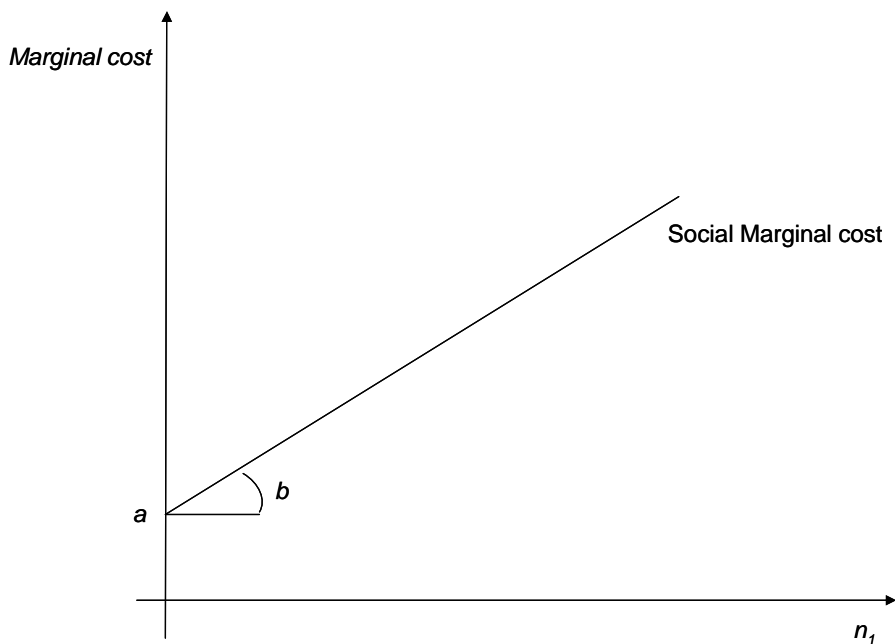
so that the (social) marginal cost of effort to provide prevention to the n_1^{th} patient is simply:

$$c'_1(n_1) = a + bn_1,$$

where a and b are positive parameters. a corresponds to the fixed unit costs of prevention, for example to the costs of a vaccination and the time cost of a consultation. bn_1 corresponds to the effort the doctor needs to provide in order to bring the n_1^{th} patient to the practice. A way to interpret this is to imagine that patients are ranked according to the cost of receiving a

preventive treatment, some being more reluctant than others. The marginal effort the general practitioner should provide increases with the number of patients receiving the preventive treatment. The first patients come after the first phone call, the next need to be called twice, etc. The social marginal cost of providing prevention can be represented as in Figure 4.1.

Figuur 4.1 Social marginal cost of prevention



In case of sickness, we assume that the costs of the appropriate treatment are equal to $c_3 = c_3(L)$, which are a function of the length of the treatment L . In our model, there is only one period of treatment (the second period) but we can capture the length of a treatment by assuming that the costs are higher for long treatments: $c'_3(L) > 0$. The costs of the treatment include medication and possibly the costs of a stay at the hospital, the costs of using medical technologies, etc. They also include the costs of efforts provided by all doctors involved in the treatment. The general practitioner bears a share k of the curative costs, the rest falls on other health care specialists.

The costs incurred by the general practitioner include the time costs of a consultation when patients become sick, and everything the general practitioner uses in order to heal the patients. If $k = 0$, the general practitioner does not incur any costs when patients are sick. This would happen if patients would not need to come back to the general practitioner when they are sick. Given the gatekeeper function of general practitioners in the Netherlands, it is reasonable to assume that $k > 0$. For some diseases, the role of the general practitioner will be limited, i.e. k will be small.

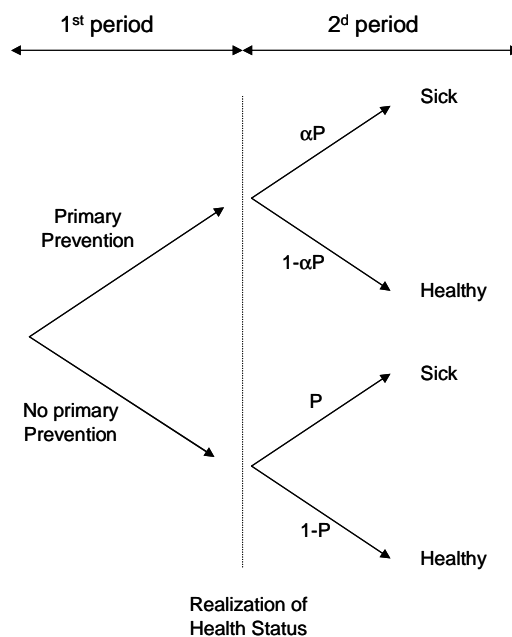
Finally, we assume that diseases have a negative externality on the rest of society. We denote by e the marginal cost of a sick person for the rest of society (think of contagious diseases or negative effects on work, etc.).

In conclusion, the expected marginal costs of sickness for society are simply equal to $Lc_3 + e$, and the total expected costs of sickness are (given that $L=1$):

$$(c_3 + e)n_3 = (c_3 + e)(\alpha p n_1 + p(1 - n_1))$$

where n_3 is the number of people receiving a curative treatment in the second period, which corresponds to the number of people becoming sick in the second period: $\alpha p n_1 + p(1 - n_1)$. The first term is the number of people who received prevention and who, despite of that, became sick. The second term is the number of people who did not receive prevention in the first period and became sick in the second period. Figure 4.2 summarizes the possible events in the model. Remember that the only variable of choice in this model is the provision of prevention in the first period.

Figuur 4.2 Strategies with respect to primary prevention



4.3.1 First best outcome

We now determine the optimal level of prevention from the point of view of society. The optimal level of prevention is such that the social marginal costs of prevention ($c'_1(n_1)$) are equal to the social marginal gains. The social marginal gains include the saving of costs of treatment and the individual disutility associated with sickness, and the avoidance of a negative externality on the rest of society.

We assume the following utilitarian welfare function ($W = \text{welfare}$):

$$W = u(h) - c_1(n_1) + \frac{1}{1+r} [(n_1\alpha p + (1-n_1)p)(u(S) - c_3 - e) + (n_1(1-\alpha p) + (1-n_1)(1-p))u(H)]$$

The optimal level of primary prevention and secondary prevention are such that:

$$c'_1(n_1^*) = \frac{1}{1+r} [(1-\alpha)p(c_3 + e + d)]$$

The left-hand side corresponds to the social marginal cost of prevention. The right-hand side corresponds to the social marginal benefits of prevention. The social marginal benefits of prevention correspond to the marginal costs of cure saved by prevention. Thanks to prevention, the number of people becoming sick in the second period falls by a factor $(1-\alpha)$. For all these people, society saves the marginal costs of cure that would have been incurred without prevention. Note that the marginal benefits of prevention are constant, they do not change with the number of people receiving a preventive treatment. One underlying assumption is that once people are sick, they are equally easy to treat (or to attract to the general practice). Again, this assumption is simplistic, but the results would not change as long as we would assume that patients are easier to treat when they are sick than when they are healthy. This seems a reasonable assumption.

We denote by n_1^* the optimal level of primary prevention. Figure 4.3. represents graphically the social marginal benefits and costs, and the optimal level of prevention. Because the social marginal benefits of prevention remain constant with the number of people receiving a preventive treatment, the graphical representation of these benefits is a horizontal line, with the intercept being equal to

$$\frac{1}{1+r} [(1-\alpha)p(c_3 + e + d)]$$

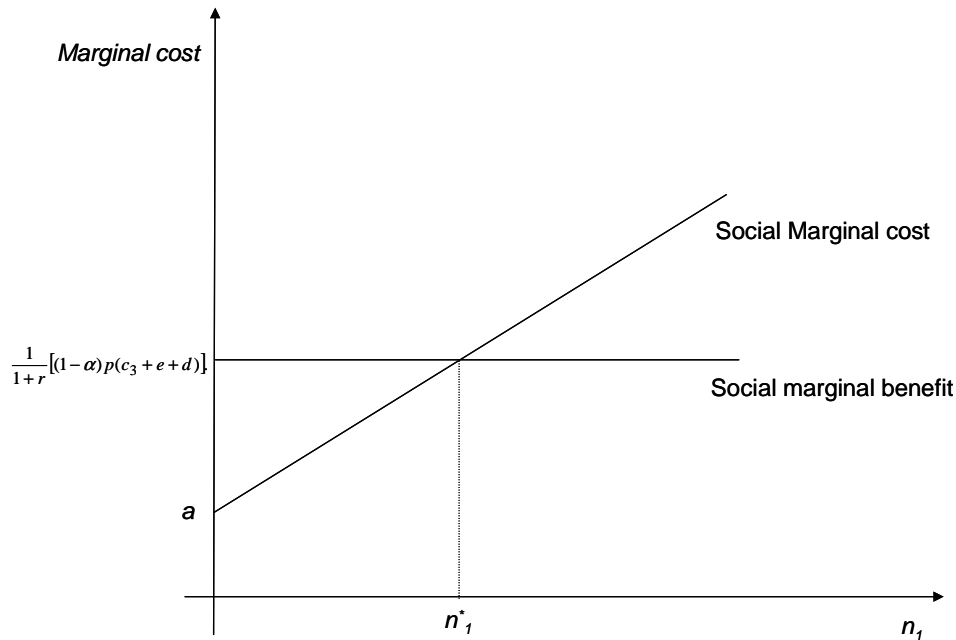
In the graph, we assumed that this term was larger than a , which means that the marginal benefits are high enough so that some prevention makes sense. Obviously if the social marginal benefits of prevention are smaller or equal to a , the optimal level of prevention will be equal to 0.

The first-best optimal strategy crucially depends on the following aspects:

1. The discount rate (-): The less important the future is, the lower the marginal gains of prevention.
2. The effectiveness of primary prevention in reducing the probability of sickness (+)
3. The probability of sickness (+)
4. The costs of treatment to cure (+)

5. The importance of the negative externality of being sick (+)
6. The disutility of being sick (+)

Figuur 4.3 Social marginal costs and benefits of prevention



4.3.2 Market outcome

4.3.2.1 General practitioners

General practitioners determine the level of preventive care. We have mentioned several arguments why GP's are reluctant to provide preventive care. We focus here on the role of financial rewards on the GP's behavior. We also show how appropriate financial rewards could stimulate GP's to provide sufficient preventive care. We consider three rewarding schemes: capitation (reward per patient registered in the practice), fee for service (reward per consultation) and target payment (lump sum paid only if the GP reaches a pre-defined target in terms of preventive care (number of patients receiving prevention)). In all three cases, we assume that the payments do not affect the welfare of society in a direct way, i.e. the extra costs incurred because of the payments correspond to additional incomes for the general practitioners. We assume that this redistribution of income does not affect the welfare of society.

Capitation

Suppose that general practitioners receive a payment per patient. We focus on financial rewards only and assume that non-financial rewards are equal to 0, and that the GP has the right beliefs about the implications of his interventions. We indeed know that part of these non-financial

rewards and beliefs probably discourage the GP to provide prevention. On the other hand ethical considerations may encourage prevention.

The expected payoff of the general practitioner takes the following form:

$$R - c_1(n_1) + \frac{1}{1+r} [R - n_1 \alpha p k c_3 - (1 - n_1) p k c_3]$$

where R is the honorarium per patient.

The maximization program of the GP comes down to the minimization of expected costs. The level of prevention minimizing the costs of the GP is such that:

$$c'_1(n_1) = \frac{1}{1+r} [(1 - \alpha) p k c_3]$$

where n^c_1 is the private optimum level of prevention under a capitation scheme (see figure 4.4). Note that since c_3 depends on the length of the treatment, the longer the treatment, the higher the incentives for prevention. Suppose for example that $c_3 = cL$, then we have:

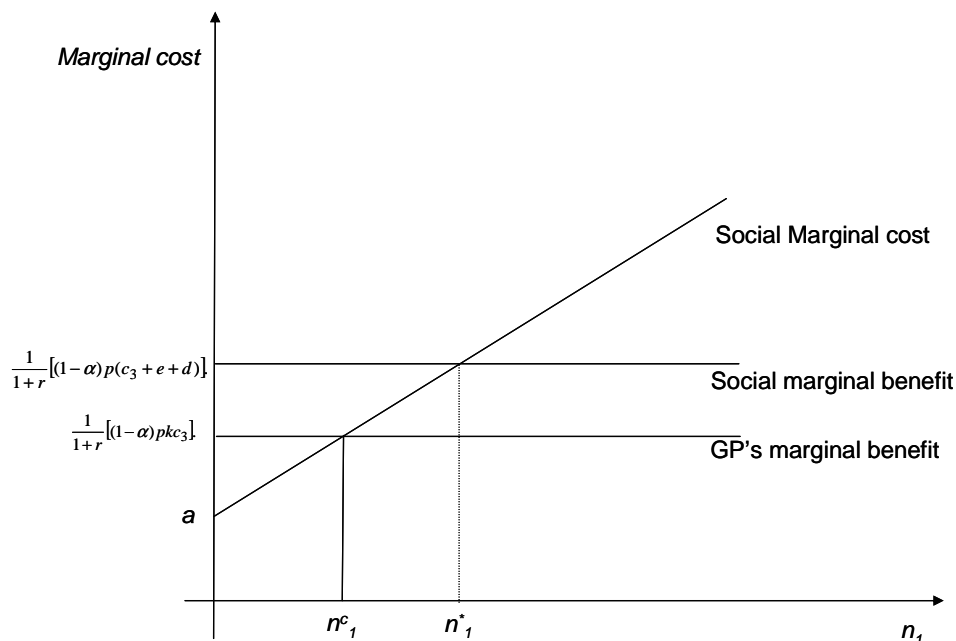
$$c'_1(n_1) = \frac{1}{1+r} [(1 - \alpha) p k c L]$$

The level of prevention will be lower than the socially optimal for the following reasons:

1. $k < 1$: The GP does not internalize the effects of prevention on the total costs of cure for society. In particular, if $k = 0$, the market optimum level of prevention will be equal to 0. The general practitioner does not care about future costs of treatment, since he will not be the one incurring these costs. The higher k is, the closer we come to the social optimum. This would be an argument for integrating the general practice in the rest of the health care sector (so that the decisions of the general practitioners reflect more the interests of the sector as a whole, which may still differ from those of society as a whole).
2. The GP does not take into account the negative externality of diseases on the rest of society.
3. The GP does not take into account the disutility of patients in case of sickness (a more sophisticated model could allow GP's to care about the patient's disutility, which would soften this conclusion).
4. In contrast to our earlier assumption the GP could have imperfect information about the effectiveness of prevention (they underestimate the effectiveness).

In Figure 4.4 we show the market optimum for prevention.

Figuur 4.4 Market optimum under capitation



One way to reach the social optimum is to provide an additional subsidy to the GP for each preventive treatment. This would shift the GP's marginal benefit curve upwards (so that they become equal to the social marginal benefit). However, in practice it would be difficult to calculate this subsidy.

Fee-for-service

Suppose now that the general practitioner receives a fee for service. We also assume that the fee is the only form of compensation for the GP. He does not receive an additional compensation for specific costs (such as vaccines). This is again for simplicity and does not alter the essence of the results. Furthermore, we assume that GP's receive a larger compensation when the treatment is longer. In the case of a long treatment, we can imagine that the patient comes back several times to the general practice. The GP gets compensated for each consultation. We assume that the total compensation is equal to fL .

The fee-for-service system has different implications for the profit of the GP than the capitation system. There are indeed two important differences:

1. The costs of prevention increase with the number of patients receiving a preventive treatment, while the fee (and in general the marginal benefit of providing prevention) remains constant. At some point, the GP will not find it profitable anymore to try to attract the next patient to the general practice.
2. A longer curative treatment means higher costs in capitation and fee-for service systems ($kc_3 = kcL$), but increases the income as well in the case of fee for service (income = fL).

The objective function of the GP can be written as follows:

$$\Omega^f = fn_1 - c_1(n_1) + \frac{1}{1+r} [n_1\alpha pL(f - kc) + (1 - n_1)pL(f - kc)]$$

Prevention reduces the probability of sickness and, therefore, the probability of earning a profit from cure $f - kc$.

The private optimal level of prevention under fee-for-service (n_1^f) is such that:

$$c_1'(n_1^f) = f - \frac{1}{1+r} [(1 - \alpha)pL(f - kc)]$$

The right-hand side corresponds to the private benefits of prevention for the general practitioner. The first is a pure benefit, i.e. the fee paid immediately for prevention. The second benefit corresponds to the marginal loss of not having to provide cure in the second period. If people become less sick, the probability of getting the profit ($f - kc$) falls and so do the marginal benefits of prevention. Strikingly the more effective prevention is, the higher the future loss in profits and so the lower the incentives for prevention. Naturally this is a simple model. In reality it is likely that GP's also care about the health of their patients (ethical considerations).

The marginal benefit of prevention under fee-for-service is smaller than under the capitation scheme if $(1 - \alpha)pL > (1 + r)$. The more effective prevention is, the larger the future income loss and the lower the marginal benefit of prevention.

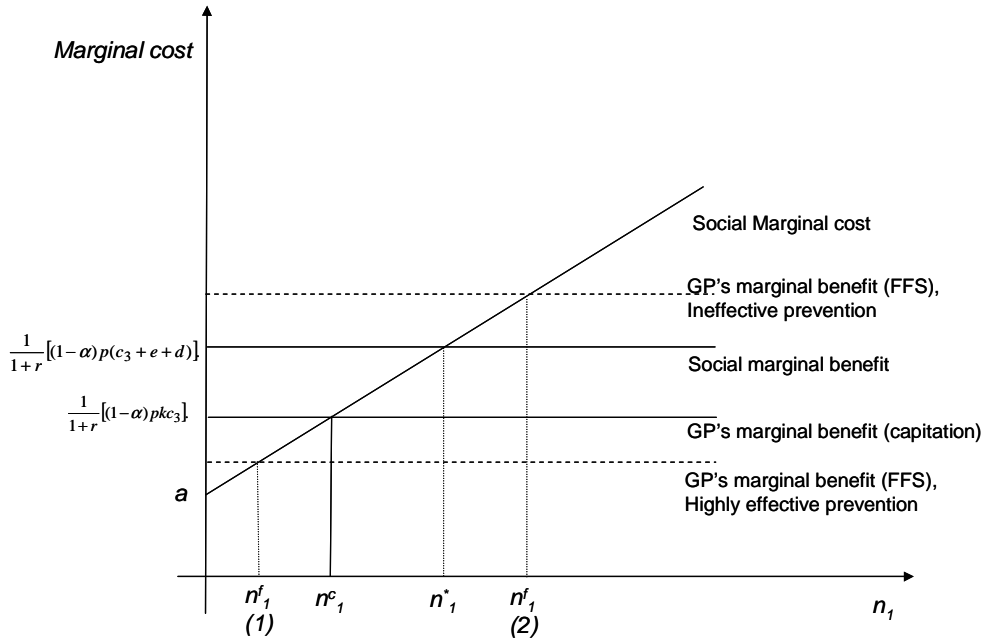
The marginal benefits of prevention in case of fee for service can be represented by a horizontal line, with the intercept equal to:

$$f - \frac{1}{1+r} [(1 - \alpha)pL(f - kc)]$$

The exact position of the line depends on the level of the fee. The position of the line in comparison with the marginal benefits of prevention in case of capitation depends on whether the condition $(1 - \alpha)pL > (1 + r)$ is satisfied or not. Figure 4.5 shows the market optimum corresponding to a fee-for-service rewarding scheme, in two illustrative cases. In the first case, prevention is highly effective, so that the GP loses a lot in future fees by providing prevention. The optimal level of prevention is relatively low (1). In the second case, prevention is not effective, so that the GP does not lose much by providing prevention now. The optimal level of prevention is relatively high (2). This means that such a system of financial rewards provides wrong incentives for prevention. Society would like to stimulate prevention when it is very effective, but the incentives are exactly opposite for the general practitioner. This reasoning clearly limits the objective of the GP's to financial incentives, but we have seen that non-

financial incentives also discourage prevention. What this theoretical analysis shows is that a fee-for-service system reinforces the disincentives even further.

Figuur 4.5 Market optimum in case of fee-for-service



It is possible however to establish a fee such that the general practitioner provides the optimal level of prevention. The optimal fee is such that the private marginal benefits of prevention are equal to the social marginal benefits:

$$f - \frac{1}{1+r} [(1-\alpha)pL(f-kc)] = \frac{1}{1+r} [(1-\alpha)p(cL+e+d)].$$

The optimal fee f^* is then:

$$f^* + \frac{1}{1+r} [(1-\alpha)pL(kc-f^*)] = \frac{1}{1+r} [(1-\alpha)p(cL+e+d)],$$

$$f^* = \frac{\frac{1}{1+r} [(1-\alpha)p(cL(1-k)+e+d)]}{1 - \frac{(1-\alpha)pL}{1+r}},$$

The optimal fee increases with the size of the externality e and of the disutility d , the effectiveness of prevention $(1-\alpha)$, the probability of sickness p , the share of costs falling on the rest of society $(1-k)$, the length of treatment L , and decreases with the discount rate.⁸

Asymmetries in the rewarding scheme would of course bias the financial incentives for prevention and cure in a corresponding way. For example, if general practitioners receive an additional compensation for a specific prevention program (as it is the case of the current system for two preventive activities), the provision of this program becomes financially relatively more attractive.

Target payments

So far, we have seen that neither capitation nor fee-for-service lead automatically to the socially optimal level of prevention. A capitation system would imply too little prevention and a fee-for-service system could lead to too little or too much prevention. In particular, the FFS encourages the GP to provide prevention when prevention is particularly ineffective, i.e. when it is particularly not socially desirable. We now turn to the third rewarding scheme, target payments. Target payments consist of a lump-sum payment to the general practitioner when a pre-defined target has been reached (for example, 60% of the population). Target payments are not common in the Netherlands but are implemented in other developed countries. The UK and Australia have recently introduced target payments for some preventive activities in the general practice. Suppose again for simplicity that the only rewards for the GP are financial rewards. The government guarantees a lump-sum subsidy S to general practitioners reaching the optimal level of prevention n_1^* . The expected payoff for the general practitioner can be computed in both cases.

$$\begin{aligned}\Pi(n_1^*) &= S - c_1(n_1^*) - \frac{1}{1+r} \left[(1 - n_1^*(1-\alpha))pkc_3 \right] \\ \Pi(n_1^p) &= -c_1(n_1^p) - \frac{1}{1+r} \left[(1 - n_1^p(1-\alpha))pkc_3 \right]\end{aligned}$$

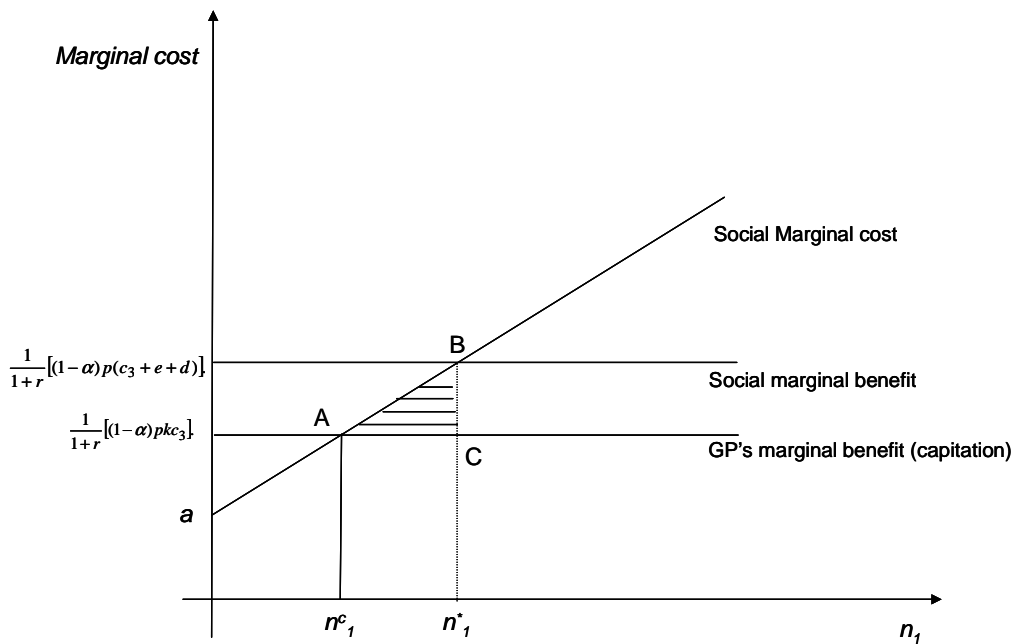
The subsidy necessary to reach the social optimum is such that:

$$S = c_1(n_1^p) - c_1(n_1^*) + \frac{1}{1+r} \left[(1 - (n_1^* - n_1^p)(1-\alpha))pkc_3 \right]$$

⁸ Since there is only one fee, the optimal fee for cure will also increase if for example the effectiveness of prevention increases. It might be difficult to distinguish between consultations for cure and for prevention.

where n^p_1 is the private optimum (under an alternative rewarding scheme). We can represent in a graph the effects of the alternative payment schemes and show how we can reach the social optimum (Figure 4.6). If the GP does not receive any target payment, he will provide prevention to the level equal to the optimal level under capitation (minimizing the expected costs). In order to reach the socially optimal level of prevention, society needs to provide a payment equal to the surface ABC in the graph. This payment compensates exactly the general practitioner for the additional costs incurred by the additional prevention.

Figuur 4.6 Market optimum in case of target payment



In order to determine the target payment, we need to know where the social optimum is and what are the social marginal costs. This is a strong requirement, which will not always be met in practice.

Optimal prevention

We have studied the implications of different rewarding schemes and shown how we could possibly stimulate prevention. The policy implications clearly depend on whether prevention is observable or not. If prevention is observable, it is possible to provide specific subsidies or a target payment. If it is not, the only way to reach the social optimum is within a fee-for-service system, where the fee is set optimally.

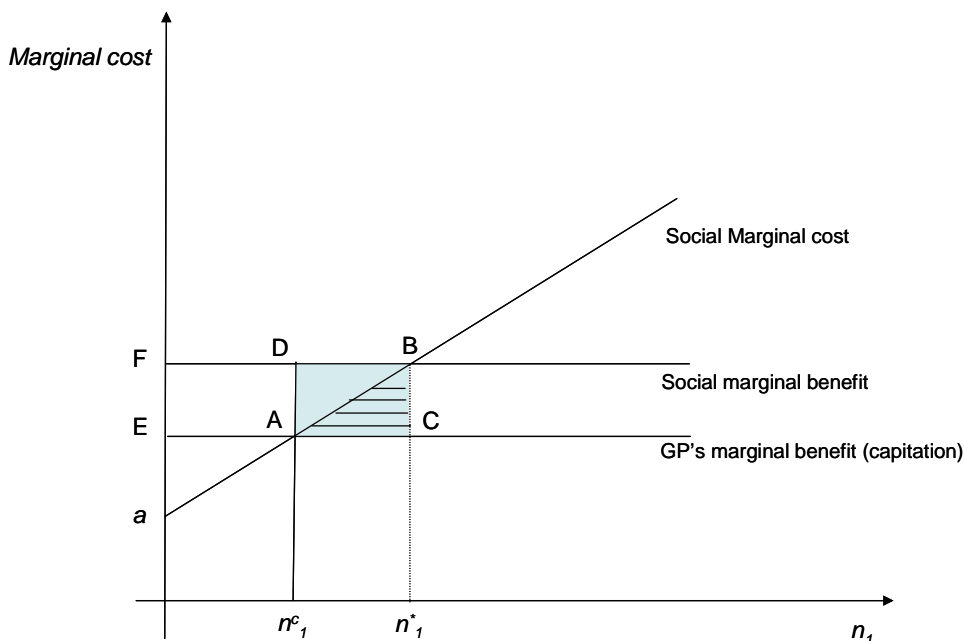
Suppose prevention is observable. There are three options to reach the socially optimum level of prevention (Figure 4.7):

1. **Direct subsidies for preventive activities:** Suppose we start from the market optimum (capitation scheme of fee for service). We can reach the social optimum by providing a subsidy equal to EFBC.
2. **Direct subsidies for preventive activities exceeding the current market optimum:** The drawback of the previous option is that the GP receives a subsidy for the patients he would have reached without the subsidy. An alternative would be to subsidize the GP only for those patients who would not have been reached without the subsidy, i.e. the patients between n_p^c and n_p^* . The total costs of this measure correspond to the surface ADBC.
3. **Target payment:** The last option would be to set up a target payment scheme, such that GP's receive a lump-sum payment if they reach the socially optimal level of prevention. The minimum lump-sum payment is the one exactly compensating for additional costs of prevention. The costs of this measure correspond to the surface ABC.

The costs associated with a target are always a share of the costs associated with direct subsidies. Target payments require two conditions:

1. **Observability of prevention needs and preventive activities:** The current large-scale prevention programs are for example defined on a series of objective characteristics. Target payments cannot be implemented for preventive activities relying on the private information of general practitioners.
2. **Perfect information about the social marginal cost function.** Obviously this condition will never be met. The current situation gives information about the private optimum. We could imagine that target payments are progressively introduced, starting with a relatively small compensation and increasing the payment if GP's fail to produce the social optimum. This supposes that GP's will not react strategically, which may be a problem (they could anticipate the increase in payment in case they do not reach the target and, because of this, decide to sacrifice the current target payment for a future better payment). A second problem could be that general practices do not all have the same social marginal cost function. Some populations of patients may be easier to reach than others. The socially optimal level of prevention would then not be identical for all general practices. One way to solve this problem would be to define different target rates depending on the characteristics of the GP's population. Another alternative is to define different targets with different payments attached to them.

Figuur 4.7 Optimal payments



4.3.2.2 Insurance incentives

Suppose a market where individuals buy insurance, paying a constant premium b each period. If insurance companies compete for patients, they will set the premium at the level of their costs per patient (suppose for simplicity that costs per patient are identical). In order to attract as many patients as possible, they have incentives to minimize the level of costs per patient. With a capitation scheme, insurers cannot influence the behaviour of the GP's. The optimal honorarium covers exactly the expected costs of the general practitioner.

With a fee for service, insurers can influence the behaviour of the GP's. In case of sickness, the insurance company covers the costs incurred in other health care sectors $(1-k)c_3$. The insurance determines a fee maximizing their profit, and taking the effect of the fee on the behaviour of GP's into account. The number of patients receiving a preventive treatment is endogenous: $n_1 = n_1^f(f)$. Compared to the capitation scheme, the level of prevention will be closer to the optimum, as insurance companies take the effect of prevention on the total costs of society into account. However, they are too small to take the externality of sickness on the rest of society into account. The fee and level of prevention associated with it will therefore be suboptimal.

As we have seen, target payments are relatively cheaper to reach a particular objective. Insurance companies could set target at the level of prevention corresponding to their optimum.

Prevention pays in the second period only. A crucial condition for optimal prevention is that the one paying for the investment is also the one benefiting from it. In a context of competition

between insurance companies, where consumers can switch insurance companies, one needs an appropriate mechanism to ensure that insurance companies can capture the gains of their investments. In the absence of such mechanism, consumers who just received a vaccination can immediately renegotiate their contracts with their current insurance company or step over to another one and negotiate a smaller premium. In such a context, insurance companies would not have incentives to pay for preventive care. Herring [2002] tested the argument on US data. He used an exogenous source of variation in insurance turnover (because of job change or change in eligibility) to measure the effect of turnover on the probability of getting a mammography. He found significant negative effects of turnover on this probability, which gives empirical support to the hold-up hypothesis.

This problem may be limited for preventive activities that are observable and, therefore, contractible.

We think of three mechanisms that could reduce this free-rider problem:

1. Organising preventive care in a different context than competing insurance companies (eg the Dutch GGD's).
2. Constraining patients to reimburse the costs of primary prevention in case they would leave the insurer. The question is whether the patient is not credit-constrained.
3. Solving the coordination problem of insurance companies by allowing them to compensate each other for the costs of prevention.

However, even if prevention is contractible, it may be that the level of prevention is sub-optimal because insurance companies do not internalize all the positive effects of a healthy population on society. Complementary policies may therefore be necessary (Subsidizing insurance companies engaging in preventive care according to the objectives of the government)

4.3.3 Secondary prevention

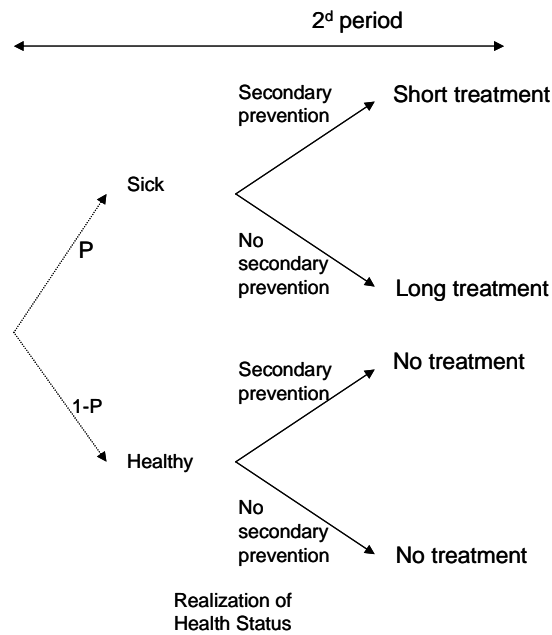
We limited the model to primary prevention. We now briefly discuss the differences with secondary prevention. Secondary prevention essentially differs from primary prevention in three ways:

1. It does not reduce the probability of sickness but reduces the costs of cure in case of sickness. Suppose that secondary prevention reduces the future costs of prevention by a factor β .
2. Since it does not reduce the probability of sickness, it has less positive externalities on the rest of society than primary prevention.
3. The gains from secondary prevention are immediate. If breast cancer is established during a screening, patients will receive a treatment immediately. The costs and benefits of secondary

prevention realize in the same period (second period). We denote the costs of secondary prevention by $c_2(n_2)$, the cost function having the same properties as the cost function for primary prevention.

The strategies of the GP with respect to secondary prevention are represented in Figure 4.8.

Figuur 4.8 Strategies with respect to secondary prevention



The optimal strategies for the GP under each scheme can be described as follows:

Capitation

The private optimum of secondary prevention will be lower than the social optimum for the same reasons as in the case of primary prevention.

Fee for service

An important question to determine the marginal benefit for secondary prevention under fee-for-service is how does the fee relates to the curative treatment. If the marginal cost of a short treatment is the same as the marginal cost of a long treatment, the GP will provide secondary prevention until:

$$c'(n_2^f) = f$$

If rewards differ across interventions, in particular if rewards are higher for short treatments than long treatments, the marginal benefit of secondary prevention will be higher. Again, it is theoretically possible to design a rewarding scheme to reach the social optimum.

Target payments

The same reasoning applies as for primary prevention.

4.4 Discussion

We studied market imperfections with the help of simple theoretical models; are these models realistic enough to lead to sound policy recommendations to stimulate prevention in the curative sector? This is especially difficult for casuistic prevention.

4.4.1 Enlargement of programmatic prevention

We presented in Section 3 a series of preventive interventions which turn out to be very cost-effective. One way of enlarging the scope of preventive activities would be to frame more activities in a program. A program is defined around a preventive activity, a target-group (based on objective observable individual characteristics (such as age, gender, etc.)) and a frequency of treatment. In that way the doctor does not have to decide about each individual preventive action.

Current programs are financed through the Exceptional Medical Expenses Act (AWBZ). Additional programs would not necessarily require additional public means. Insurance companies would benefit from prevention as well. Some preventive activities have large positive externalities on society (e.g. vaccination against infectious diseases). GP's and insurers are too small to take these externalities into account. Other preventive activities have improvements in health as their main benefit and not long term cost-saving. Both types of preventive activities can not be left to insurance companies alone.

For the other preventive activities, where the positive externalities on society are less important, public authorities need to provide the appropriate incentives to insurance companies. Insurance companies should be encouraged to reduce the expected costs of health care. One problem with prevention is that the benefits are often in the long run, while the costs are immediate. In order to encourage insurance companies to stimulate prevention, we should allow them to compensate each other for the costs of preventive activities that have long-term financial benefits. Insurance companies with public schemes are currently compensated according to the characteristics of their population. It might be worthwhile to analyse if this compensation system could be adjusted for well-defined preventive activities. The compensation system in it's current state may be a disincentive for prevention, as unhealthy clients yield a higher compensation for insurance companies. The system was not designed to stimulate prevention but to remove incentives for risk selection.

Furthermore, insurers should have the freedom to determine how they compensate general practitioners for preventive treatments. In case of well-defined programs, the government could introduce a target payment system for general practitioners. The experience of other countries could help in designing appropriate rewarding schemes.

Several countries use financial incentives to stimulate preventive care in the general practice (Boyden and Carter (2000)). The UK has a relatively long tradition in that respect (childhood immunisation, cervical cancer and cardiovascular disease). The UK has introduced target payments for several preventive schemes:

1. Immunisation for children aged two and under. Two targets: 70% (low payment) and 90% (high payment) of the eligible population.
2. Pre-school booster for children aged five and under: Two targets: 70% (low payment) and 90% (high payment)
3. Cervical cancer screening: Two targets: 50% (low payment) and 80% (high payment) of the eligible population (women who are aged 25-64) should have had a cervical smear test, taken by any source, during the last 5.5 years.

The fees payable in 2001 looked as follows:

Tabel 4.1	Target payments (in English pounds) payable from October 1, 2003	
	Low payment	High payment
Immunisation for children aged two or under	980	2,940
Pre-school booster for children aged five and under	293	880
Cervical cancer screening	1090	3,270

The rates of immunization have significantly increased with the introduction of the target payment system, but it is not so clear whether this was the only reason. More efforts were made at the same time to improve the efficiency of these preventive measures (Boyden and Carter).

General practitioners receive half of their revenue on a capitation basis and the other half on the basis of particular services provided. Next to the target payments, they receive direct compensation per unit for various preventive measures such as vaccination and immunisation carried out for reason of public policy, pre-natal and post-natal care, etc.

4.4.2 Enlargement of casuistic prevention

Not all preventive activities can be provided in a systematic way, i.e. based on observable and objective individual characteristics. The doctor is particularly well-placed to appreciate the needs of patients in terms of preventive care. This type of preventive care can only be casuistic. It is of course much harder to stimulate this type of preventive care, as it cannot be framed in pre-defined rules. We have seen that in our simple model this type of prevention can only be stimulated within a fee-for-service system, with an appropriate fee. However, this model may be too simple to make policy recommendations. In the model there is no cure in the first period, only prevention. A choice between spending time on prevention or on cure does not have to be made. In reality this is an important aspect. The available amount of time is limited and more time for prevention means less time for cure. When fees are increased to stimulate prevention but the fee does not discriminate between cure and prevention, the bias in favour of cure may become even larger. Apart from that, ethical considerations of doctors are absent from the simple model. Further analysis is necessary before we are able to make policy recommendations on this point.

One major obstacle to the provision of casuistic preventive care lies in the lack of information and skills doctors suffer from. Public authorities could help improving these information and skills. A direct channel to influence doctor's skills is of course via the educational programs of medical schools. Alternatively, public authorities could sponsor training programs for specific preventive activities (e.g. for folic acid consumption, health counselling, etc.). General practitioners participate already in various training programs. Education for preventive care could be offered as well.

4.5 Conclusions

Imperfect information and externalities in the market for prevention lead to a suboptimal level of preventive care. Appropriate financial rewarding schemes could help stimulating prevention in the curative sector. Insurance companies should have incentives to stimulate prevention, and should therefore be able to compensate each other for the preventive activities they undertake. In the presence of externalities, the market will always provide a suboptimal level of preventive care. Government intervention is necessary to reach the socially optimal level of prevention in the curative sector. For contractible prevention target payments turn out to be the cheapest way of reaching the social optimum. It requires however to know where the social optimum is. Alternative policies could be subsidies directed at pre-defined preventive activities. Doctors are most likely to provide preventive care if they have the appropriate skills and information. Public authorities could stimulate further the diffusion of information about preventive care. Given all these activities it is likely that the level of casuistic prevention will still be suboptimal, because

this type of prevention is very difficult to contract. Further analysis will be necessary on this point.

5 Conclusions

Prevention currently receives relatively little attention in the curative sector. Only two preventive activities are currently organised on a large-scale and in a systematic way: influenza vaccination and cervical screening. There are many arguments in favour of prevention in the curative sector: Almost everyone in the Netherlands is registered at a general practice, most patients visit their general practitioner at least once a year, prevention can be tailored to the patient, patients attach more importance to the doctor's advice than to any other source of information, etc. Many studies underline the cost-effectiveness of several preventive activities, such as smoking cessation advice, stimulation of breast feeding, blood pressure controls. The experience shows that doctors are somewhat reluctant to provide preventive care. They state that they lack skills and time to provide adequate preventive care. We investigated the reasons why the market fails to provide sufficient preventive care. We show that the set of beliefs, non-financial and financial rewards attached to medical care currently favours cure and discourages prevention. Externalities can explain why doctors and insurance companies do not aim for an optimal level of prevention. The model we used is too simple to make a complete analysis of policy. Still, among possible policies to stimulate prevention in the curative sector, three policies can be identified as promising: Enlargement of the basic insurance package to more cost-effective preventive programs, target payments for preventive activities and subsidies to educational programs for doctors. One should also make sure that insurance companies can compensate each other appropriately for the costs of preventive care. Possible financial benefits of preventive care are indeed in the long run, which could discourage prevention in a system where people can switch insurer every year, as is the case in the new health care system. Non-financial benefits of prevention are not internalised by the insurance companies. Even when these policies are implemented, the level of casuistic prevention is probably still too low.

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Annexes

Figure A.1. Cost-effectiveness of opreventive measures (Mc Ginnis (2003))

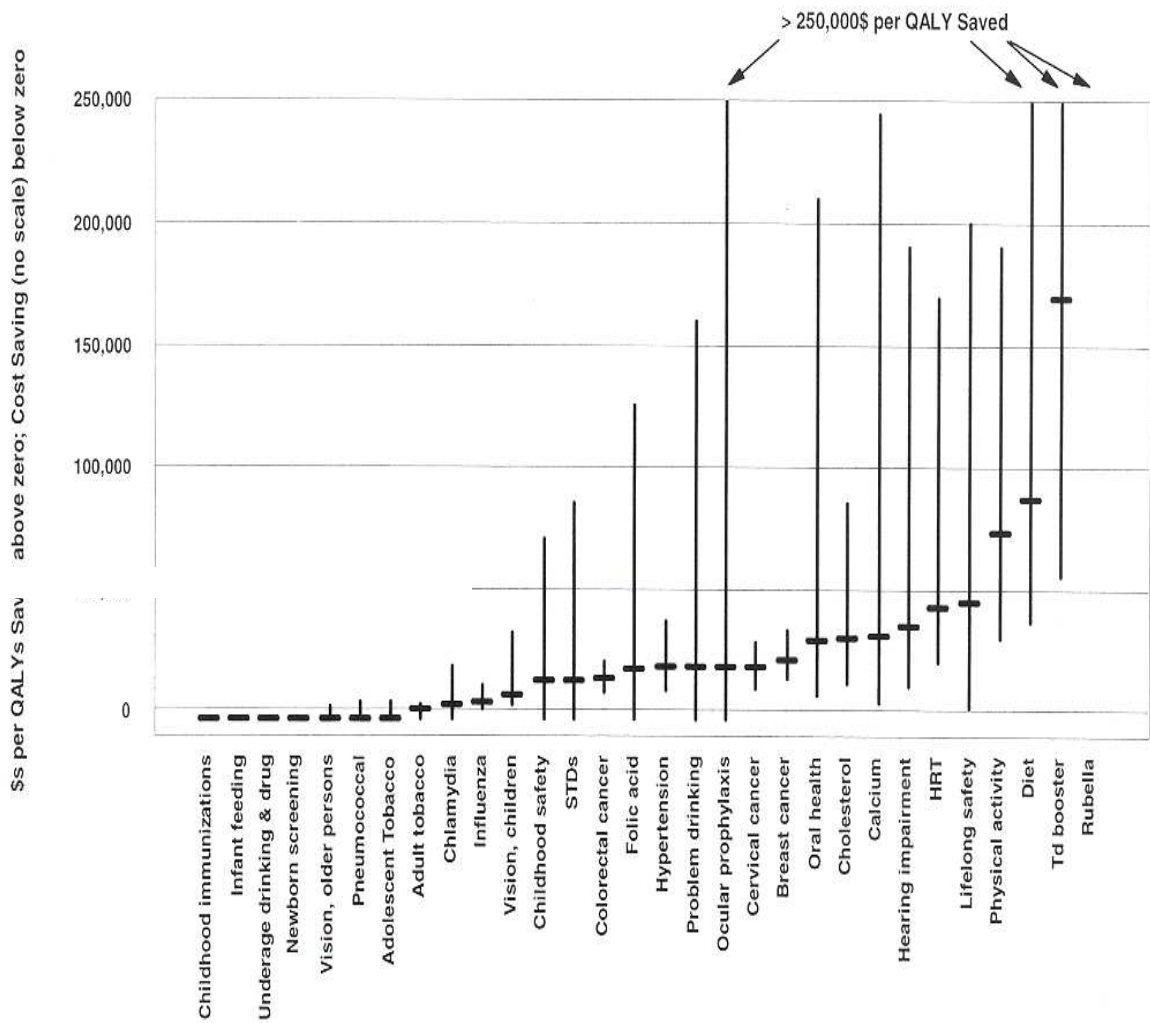


Figure 3. Cost-effectiveness ranges. HRT, hormone replacement therapy.