

LIFESTYLE

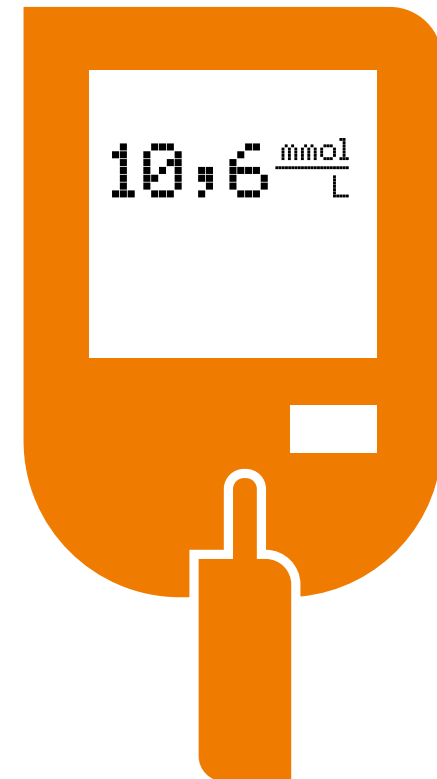
AS A

MEDICINE

BUSINESS CASE FOR TYPE 2 DIABETES

TYPE 2 DIABETES IS A MAJOR AND GROWING PROBLEM

- › At the end of 2016, nearly one million people in the Netherlands were suffering from the lifestyle disease Type 2 Diabetes Mellitus (T2D). Around 55,000 people develop this disease each year.
- › T2D has a huge impact on people's lives. Each day, they have to take various medicines, or inject insulin. They often feel very tired, and the illness even stops some people from working. In the long term, T2D can have serious effects, such as nerve damage, cardiovascular disease and blindness.
- › The medical costs involved, plus the loss of labour productivity, mean that T2D costs society a great deal of money.
- › **TNO is looking for partners to help it tackle the root cause of this major public health problem: lifestyle as a medicine (LaM).**



THE BUSINESS CASE FOR LIFESTYLE AS A MEDICINE

- › **Goal:** To clarify the pros and cons of 'Lifestyle as a Medicine' as a means of reversing and curing the lifestyle disease Type 2 Diabetes.
- › **Scope:** The business case focuses on healthcare professionals who want to help deal with a social problem.
- › **Approach:** This business case was prepared by TNO and the Vintura consultancy, who drew on the knowledge of experts from the healthcare sector. To give a broad outline of the overall picture, the business case is based on an individual with an average case of Type 2 Diabetes. Public data was used for this purpose. Where no data was available, conservative estimates were made based on the judgement of experts.
- › **Contact:** If you require further details or if you wish to use data from this business case, please contact Peter van Dijken (peter.vandijken@tno.nl).
- › **Disclaimer:** TNO and Vintura based their business case on the most recent and accurate information possible. However, no rights can be derived from this business case. It indicates a direction, but it does not provide a guarantee.



CONTENTS

- › **Introduction: Type 2 Diabetes and Lifestyle as a Medicine**
- › Framework of the business case
- › Main findings of the business case
- › Conclusion

LIFESTYLE COUNSELLING CAN REVERSE T2D

- › T2D is currently a progressive disease, and its treatment focuses on symptom management.
- › However, there is convincing evidence that lifestyle counselling can not only manage T2D, it can also reverse the organic changes involved. This has many benefits for patients, such as less medication (or none at all), more energy, empowerment and a healthier lifestyle.
- › Reversing T2D involves the latest scientific and technological insights in diagnosis, diet, exercise, motivational coaching, health literacy, digital health, etc.



TNO INNOVATES: THE 'LIFESTYLE AS A MEDICINE' PROGRAMME

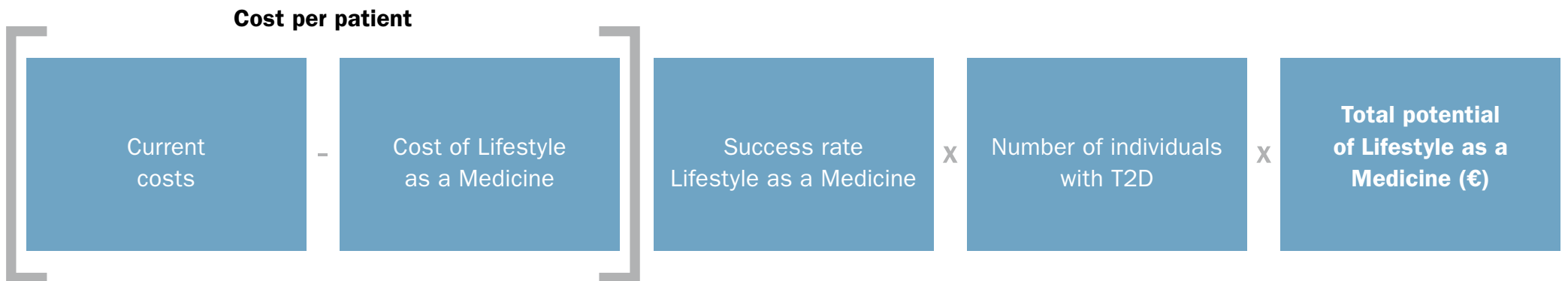
- › In the context of the 'Lifestyle as a Medicine' programme, TNO is working with various partners to develop and implement a lifestyle-based curative programme for T2D in the Netherlands.
- › To this end, a new methodology is being developed in which – in addition to medical interventions – healthcare professionals attempt to bring about long-term behavioural changes centred around a healthy lifestyle.
- › The issues that TNO is currently working on include: Which intervention is of most benefit to the patient? Which diet is best for the individual in question? How can we support patients in a way that helps them make permanent changes to their lifestyle?
- › In addition to the advantages that 'Lifestyle as a Medicine' offers patients, the formal incorporation of this new type of care into the healthcare system brings a number of social and financial benefits. It could conceivably be used to treat a range of other lifestyle diseases.



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HOW IS THE POTENTIAL OF LIFESTYLE AS A MEDICINE CALCULATED?



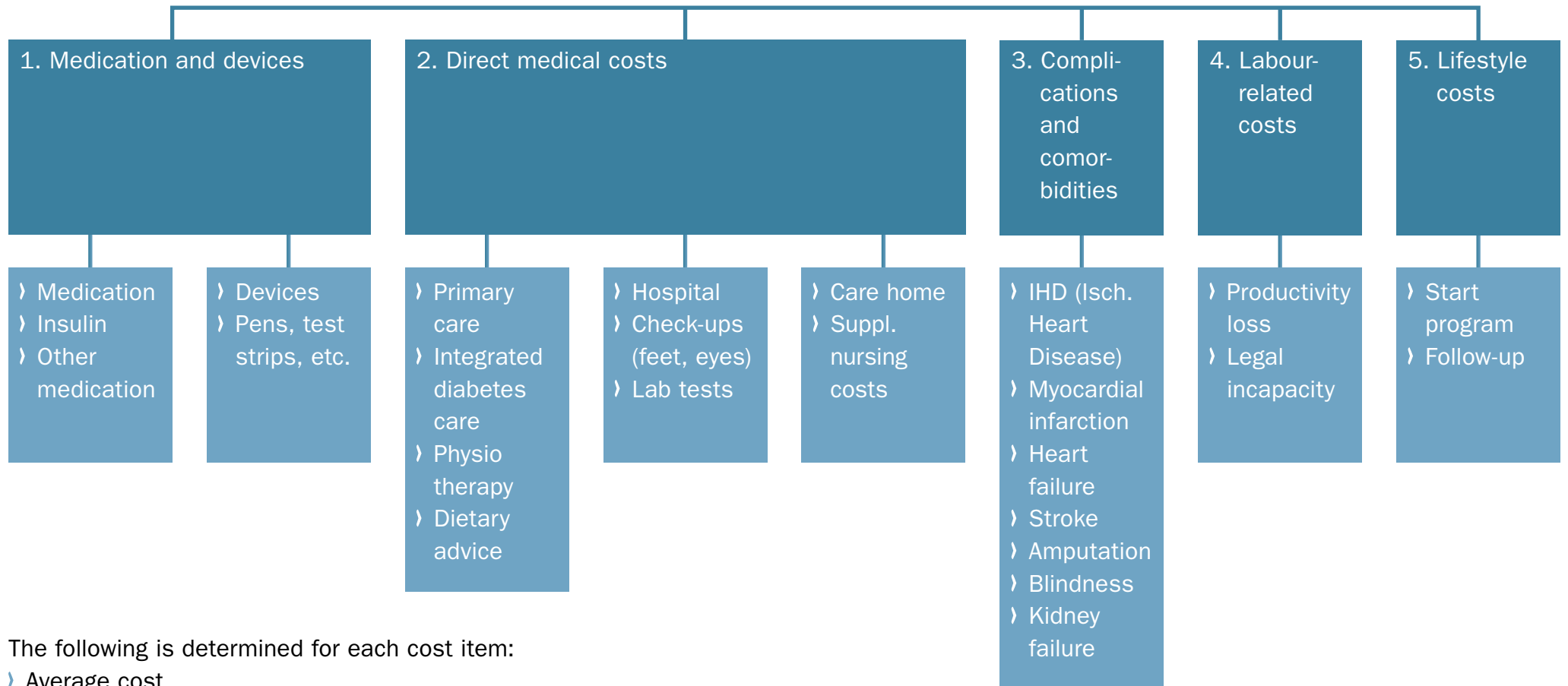
1. Medication costs and devices
2. Direct medical costs
3. Cost of complications and comorbidities
4. Labour-related costs

The next three slides give further details about the various components:

- › Cost per patient
- › The success rate
- › The number of T2D patients

COSTS OF TYPE 2 DIABETES

COSTS OF TYPE 2 DIABETES



The following is determined for each cost item:

- › Average cost
- › Changes in the costs involved throughout the course of T2D

* See this slide's notes regarding the points to be considered when interpreting the costs.

LIFESTYLE AS A MEDICINE'S SUCCESS RATE

DEFINITION

Lifestyle as a Medicine is considered to have succeeded if patients:

1. no longer need to take all of their blood-glucose-regulating medication and;
2. if they are able to stay off it for the rest of their lives.

Lifestyle as a Medicine's **success rate** is the percentage of people for whom this programme is successful.

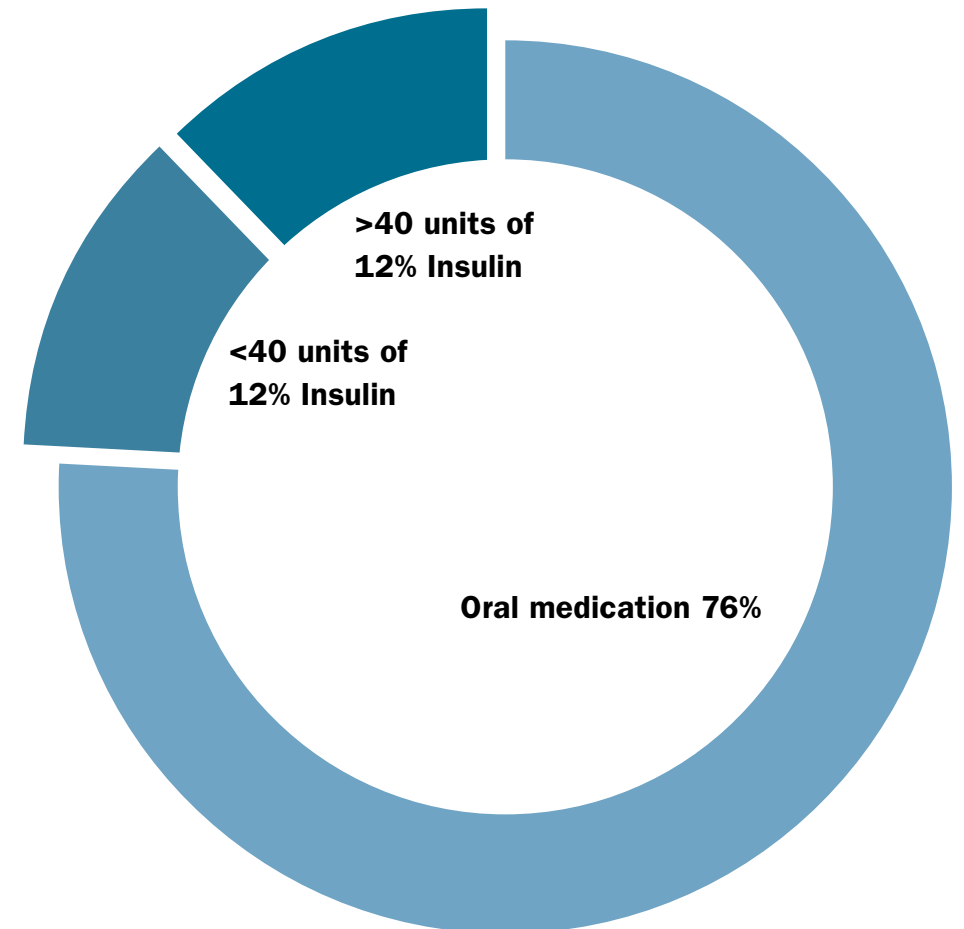
ASSUMPTIONS

The long-term success rate will be 40%

- › Conservative estimate: 30%
- › Assumption: 40%
- › Optimistic estimate: 50%

NUMBER OF PEOPLE WITH TYPE 2 DIABETES

IN 2016, THERE WERE APPROXIMATELY 990,000 T2D PATIENTS IN THE NETHERLANDS. THE VAST MAJORITY OF THESE PATIENTS TAKE MEDICATION EVERY DAY.



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ENORMOUS POTENTIAL SAVINGS AT NATIONAL LEVEL

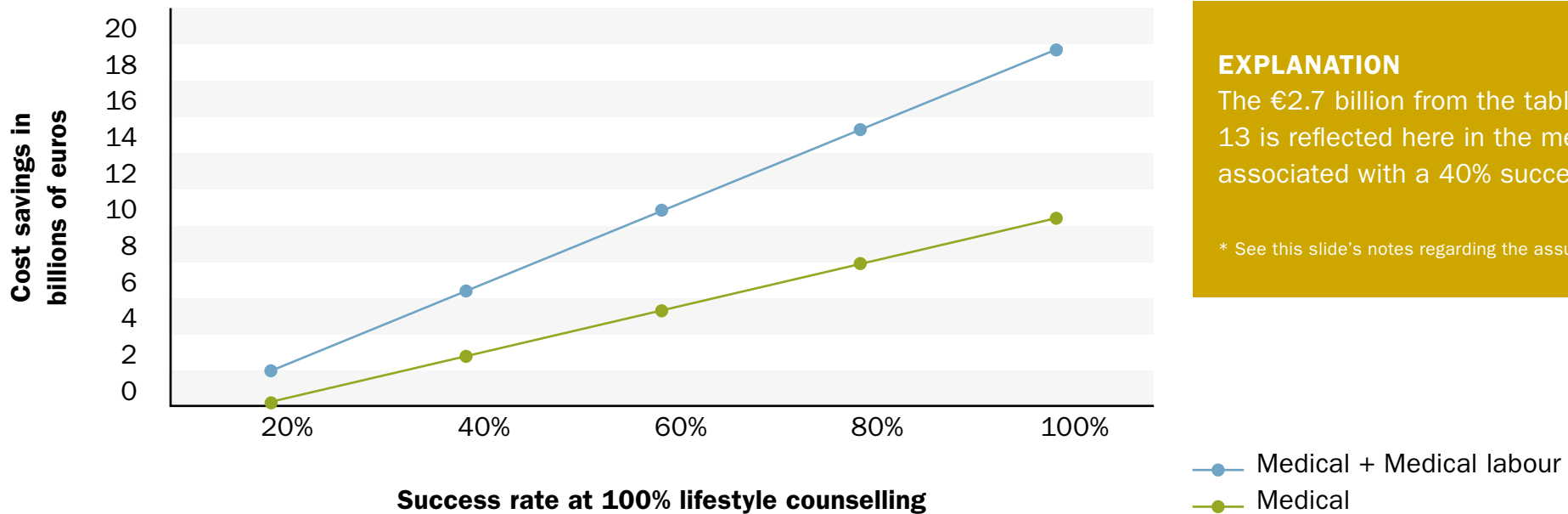
If 40% of all current T2D patients were to be permanently cured as a result of Lifestyle as a Medicine, that would save Dutch society about €2.7 billion in medical costs over the next five years!

Group	Number of individuals	Cost savings per patient (in €)	Cost savings for group (in millions of €)
Oral medication	725,400	1,708	1,285
Insulin (<40 units per day)	118,800	3,329	395
Insulin (>40 units per day)	118,800	8,611	1,023
Total			2,703

NB: This does not include the potential cost savings in terms of labour, due to reduced sickness absenteeism or reduced occupational disability.

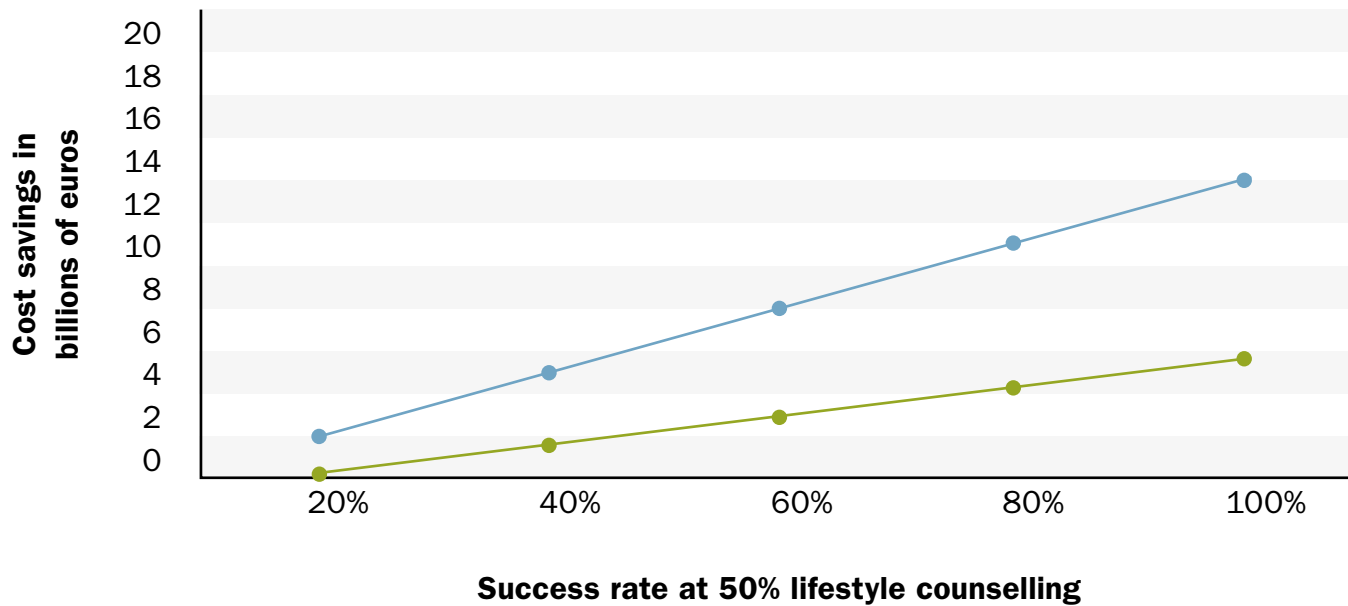
COST SAVINGS VERSUS SUCCESS RATE

The higher the success rate of Lifestyle as a Medicine, the greater the programme's cost savings at national level. The graph below shows the savings associated with various success rates over the next five years. In addition to the medical expenses involved, the total costs (medical + labour) are shown.



COST SAVINGS VERSUS SUCCESS RATE

Aside from the success rate, cost savings are also dependent on the number of T2D patients that actually take part in Lifestyle as a Medicine. The figure shown below is the amount that could be saved if 50% of T2D patients were given lifestyle counselling.



EXPLANATION

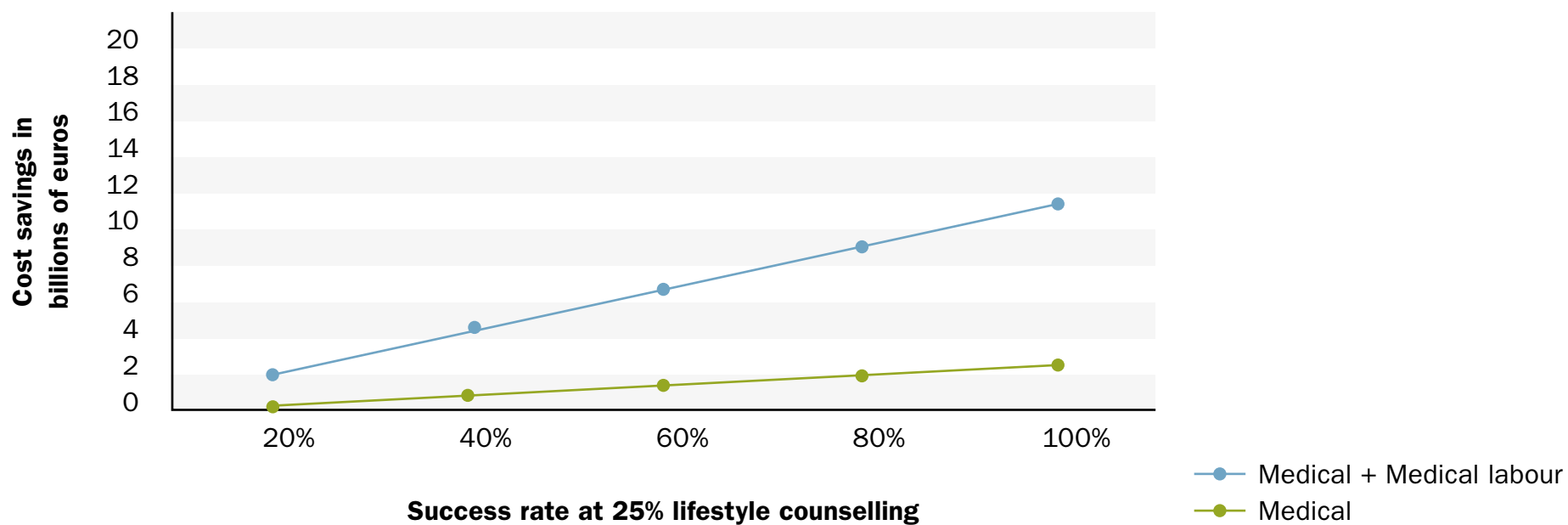
This figure is based on the assumption that half of all T2D patients will take part in LaM. The process of selecting subjects for participation in LaM will be based on exclusion criteria. This will boost the success rate.

* See this slide's notes regarding the assumptions made.

—●— Medical + Medical labour
—●— Medical

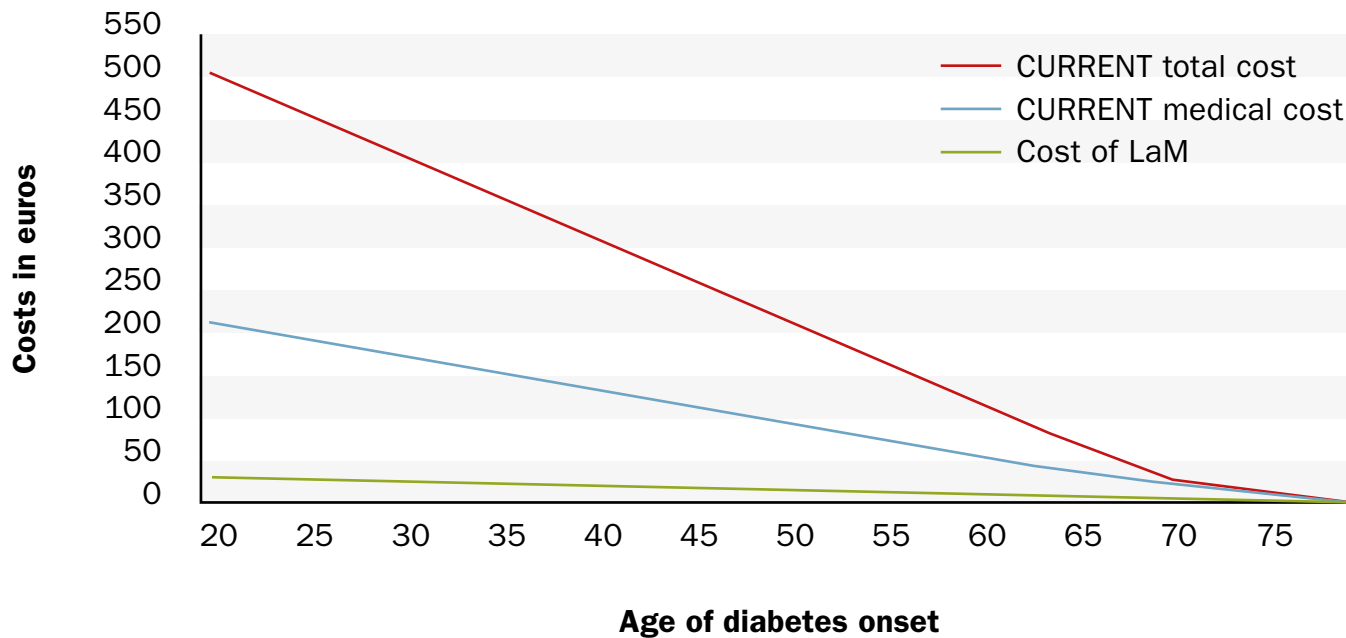
COST SAVINGS VERSUS SUCCESS RATE

The figure shown below is the amount that could be saved over the next five years if 25% of T2D patients were given lifestyle counselling.



LIFESTYLE AS A MEDICINE CONSISTENTLY COST EFFECTIVE FOR T2D, REGARDLESS OF AGE AT START

The costs incurred by newly diagnosed T2D patients throughout the remainder of their lives depend on the age at which the disease manifests itself.



CALCULATING COST SAVINGS

The cost savings per T2D patient are calculated by subtracting the cost of Lifestyle as a Medicine from the current costs.

* Note: The total costs include both medical costs and labour-related expenses.

EXAMPLE

The average age of onset of T2D is 55. The total cost saving that can be achieved throughout the remainder of a 55-year-old patient's life is $\text{€}136,329 - \text{€}10,385 = \text{€}125,944$. This can be derived from the graph by subtracting the data point on the green line (cost of Lifestyle as a Medicine) from the red line (current total cost) at an onset age of 55.

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THE POTENTIAL OF LIFESTYLE AS A MEDICINE

- › This business case shows that Lifestyle as a Medicine is financially beneficial. If 40% of all T2D patients were to be permanently cured, that would save the Netherlands about €2.7 billion in medical costs over the next five years!
- › These potential cost savings are even greater if you allow for the fact that those T2D patients whose illness currently prevents them from working would be able to return to work.
- › Depending on factors such as the patient's health, and on the intensity and type of treatment involved, the results can be quite spectacular. Various beneficial spin-off effects can also be expected, such as increased vitality and productivity, as well as a reduction in other lifestyle-related diseases. These effects have not been included in the current business case.
- › However, the most important consideration by far is the enormous impact that Lifestyle as a Medicine has on the lives of T2D patients. For them, it can lead to a healthier and happier life, without medication.

IF 40% OF ALL T2D PATIENTS WERE TO BE PERMANENTLY CURED, THAT WOULD SAVE THE NETHERLANDS ABOUT €2.7 BILLION IN MEDICAL COSTS OVER THE NEXT FIVE YEARS!



FANCY BEING PART OF LIFESTYLE AS A MEDICINE?

- › We are setting up an innovation centre to target the nationwide implementation of Lifestyle as a Medicine in the healthcare sector, to prevent and cure lifestyle diseases.
- › Would you like to be part of this? We would be delighted to discuss the options for future cooperation with you. Please contact Peter van Dijken (peter.vandijken@tno.nl).

NOTES

Note concerning page 9

Note, when interpreting the costs involved, it is important to bear the following points in mind:

- › The cumulative incidence of complications (source UKPDS 1990) is too high, because the treatment of T2D has improved over the past 25 years.
- › The business case does not include all of the associated complications and comorbidities, only the seven most common ones.
- › Various sources giving details of the cost of comorbidities have been identified, however it is known that these costs are very difficult to estimate (source: RIVM)
- › When calculating the costs involved, no allowance was made for the projected increase in healthcare costs. Costs are expected to rise as expensive new medicines become available.

Note concerning pages 14, 15 and 16

Main assumptions

- 1) Savings in the cost of labour (= sickness absenteeism and occupational disability) were only included for T2D patients between the ages of 20 and 59.
- 2) Savings in the annual cost of labour (= sickness absenteeism + occupational disability) are independent of age.

Note concerning page 17

Assumptions made

- 1) T2D patients have a life expectancy of 75 years.
- 2) The disease course is as follows: T2D patients take oral medication for 10 years, then up to 40 units of insulin per day for five years, and after that more than 40 units of insulin per day.
- 3) The statutory retirement age is 67.
- 4) People start work when they are 20.
- 5) Labour costs are independent of age.



THANK YOU FOR YOUR ATTENTION