



White Paper
Social Business case
Medication Dispenser

OBJECTIVE

With this study, we offer healthcare organisations an insight into how to compile a social Business Case (sBC) for healthcare technology. We do this by outlining, step by step, how we went about compiling the sBC for the case study, Medication Dispenser. We also gained insight into the sBC methodology from the business cases, [day-structure robots](#) and [smart key solutions](#).

Preamble

This exploration was done in collaboration with Ahmed Hamdi of Verwey Jonker Institute. He is a specialist in the field of social return analyses, evaluations and social business cases.

We also worked with a number of care organisations. Care organisations De Zorggroep, Opella, Savant and TWB used the medication dispenser in 2019 and are considering using it with more clients. At the time of writing, care organisation IJsselheem was not yet using the medication, but is planning to do so.

These care organisations are curious about the costs and benefits for their own institutions, as well as the social costs and benefits. With this information, the right choice can be made for structural financing of this application, by both the care organisation and the health insurer. Thanks to the data and experiences provided, an overview could be made of the costs and the potential qualitative and quantitative returns of the medication dispenser for the organisations in question.

Disclaimer

It is important to emphasise that the qualitative and quantitative yields explored will not fully reflect the use of the medication dispenser within other healthcare organisations. This is an estimate based on the data we received from various care organisations. The revenues are a snapshot and depend on the working method within a facility. They also depend to a large extent on the type of medication dispenser, the target group for which you are using the technology and the agreements made with the supplier and the care organisation.

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1. WHAT IS A MEDICATION DISPENSER?

More and more healthcare organisations are deploying the medication dispenser. The medication dispenser is used to remind the client to take the correct medication. A dispensing roll can be loaded into the device where the medications are sorted into individual sachets for each dosage time. There are one or more sachets for each dose for the day. At the pre-set time, the medication dispenser gives a signal. After a push on the button by the client, the device will dispense the medication. A care response centre and/or home care organisation will receive a notification if someone fails to take a sachet from a roll or a loose sachet of medication.

Care organisations use the medication dispenser for clients who forget to take their medication and need to be reminded to do so. This is usually due to a form of dementia or mild cognitive impairment (MCI). This way, the medication dispenser replaces the care professional in administering the medication.

At the time of writing, only the Medido or Innospense was on the market. All care organisations that participated in this study used this medication dispenser. In the meantime, other medication dispensers have come on the market. [See the guide](#) for more information.



2. WHAT IS AN SBC?

A Social Business Case (sBC) provides insight into the potential added value of an eHealth application through a structured cost-benefit consideration that brings together economic and social effects. An sBC provides insight into how the costs and revenues are divided among various parties over a given period.

An sBC can show, for example, that a care organisation is investing in a technology, while the financial returns go to another party. Think of the municipality or a health insurance company. Without proper agreements on the distribution of costs and revenues, the chances that this healthcare organisation will invest are slim.

By making these 'pain points' visible, you can have a better discussion about the investment. With an sBC you look beyond the boundaries of your own organisation. You look at all the positive, negative, planned and unplanned effects on society as a whole. This is different from a normal business case in which you only look at the expected direct impact on, for example, a healthcare organisation.

An sBC always compares a project alternative with a reference alternative. Here, the project alternative is what happens in practice when you use the medication dispenser. The reference alternative is what happens in practice if you do not. In this case study, it is the dispensing of medication by the healthcare professional. We are looking specifically at the clients that care professionals estimate will benefit from the use of the medication dispenser.

2.1 The Purpose of this White Paper

The purpose of this Paper is to share how we went about preparing an sBC. We would like to offer healthcare organisations an insight into how an sBC of healthcare technology can be compiled. We do this by using the case of the medication dispenser. If you would like to know what recommendations and focus points are necessary if you want to compile an sBC yourself? Then read the publication (in Dutch): ["Opbrengsten van eHealth thuis in beeld"](#).

3. METHOD

How did we compile an inventory of social costs and benefits? We combined desk research, a focus group and a questionnaire to answer the following questions:

- Which target group will use the medication dispenser?
- What is the reference alternative at the participating care organisations?
- What is the project alternative at the participating care organisations?
- What are the investment costs?
- What are the expected returns?

In order to calculate the returns (benefits), it is necessary to determine what impact the medication dispenser will have and to what extent. Ideally, these effects should be demonstrated and substantiated in a full-fledged effectiveness test, including a control group. Such an analysis is a study in itself. This was well beyond the scope and capabilities of the current study.

As an alternative, therefore, this study (as in most comparable studies) worked with figures from a few participating care organisations, practical experience and expert assessment from these organisations, as well as available insights from published research. Based on this, we can provide a rough outline of the costs, and the likely impact and returns (savings) of using the medication dispenser. The quantitative outcomes should be seen as an indication of the direction and magnitude of the costs and revenues and not as precise calculations.

Desk Research

For the desk research, a search was done in Pubmed, Scopus, Google, Google Scholar, Springerlink, ICT-Health and ZonMw on 24-07-2019. Inclusion criteria used: full text available and published between 2009 and 2019. The articles also had to cover the user experience, efficacy or effects of the use of the medication dispenser. Articles written by suppliers themselves were not included due to possible conflicts of interest.

Focus Group

On June 3, 2019, we organised a focus group with five employees from four healthcare organisations. Their functions were: innovation project officer, policy and quality advisor, innovation supervisor, innovation advisor and district nurse. We determined the target group of the medication dispenser, the reference alternative, the project alternative and the revenues they predict from the use of medication dispensers. We incorporated these predictions into an effects map. The Theory of Change supports this effects map (van den Berg & Haan, 2019; Ten Hoorn & Stubbe, 2013; Maas & Liket, 2010; Clark, 2004; OECD-DAC, 2002; Kroese, 2015). It should be noted that the expected effects are based on the desk research and the experiences of the professionals involved. Within this exploratory study, no measurements were made to demonstrate these effects with empirical data.

Questionnaire

We prepared a questionnaire to determine the quantitative investment costs and revenues of the project alternative (medication dispenser deployment) compared to the reference alternative. Five focus group participants completed this questionnaire between August 2, 2019 and October 21, 2019. The questions were based on the insights into the care process that were obtained during the focus group. Following the distribution of the questionnaire, there was a telephone call with all respondents to provide any assistance required in completing the questionnaire.

4. TARGET GROUP

In order to determine the social costs and benefits of a medication dispenser, it is first of all important to know for whom it is being used. In this study, we based our investigation on the target group selected¹ by the five participating health care organisations:

Clients living at home who, under the provisions of the Dutch Long-term Care Act (Wet langdurige zorg -Wlz) or Dutch Health Care Insurance Act (Zorgverzekeringswet - Zvw) require the administration of medication, who:

1. Need help administering medication

The district nurse assesses whether someone needs help taking medication. The district nurse then applies for an authorisation from Zvw or Wlz. Clients who are not authorised to handle medication are still able to take it themselves or have an informal carer help them to do so. They will receive, for example, a roll of pre-sorted sachets from the pharmacy with a simple manual dispenser.

2. No contraindications

A contraindication can be a reason not to use the medication dispenser. For example, if the risk of not taking the medication is greater with automatic dispensing than with physical dispensing of the medication. This may be the case if the client (or his resident informal care giver) is not capable of a reasonable degree of self-management. Another reason may be that the client does not have a telephone, which can be used to signal an irregularity.

¹ It may be that your own healthcare organisation has different inclusion criteria. In this case, a number of care organisations use what is known (in Dutch) as a BEM-score: 'Beoordeling eigen beheer van medicatie' (Assessment of own management of medication).

5. REFERENCE ALTERNATIVE

What would happen in practice, if you did not make use of the medication dispenser? This is also called "the reference alternative." By comparing the project alternative to this, the costs and benefits can be assessed.

Together with the participating care organisations, we considered various reference alternatives, such as a pill box, medication alarm, reminder on your smartphone, having medication administered by an informal caregiver and having medication administered by a care professional. In this case study, we chose the administration of medication by a healthcare professional as the reference alternative. Care organisations indicated that this was the most likely alternative. All five care organisations involved, worked with this reference alternative.

5.1 Care Process

If a healthcare professional administers the medication, in some cases he/she travels specifically to the client for this purpose. In other instances, this may be combined with another care moment. In the latter situation, it means that the care activities are adjusted to suit the time when the medication must be administered, taking into account a range of +/- 2 hours². In that case, no extra travel time is involved. Clients receive a roll of pre-sorted sachets from the pharmacy once a week or every two weeks. The care professional puts the medication

in a dish and places it at a central point in the home or asks the client where they would like to have their medication. For some clients, the care professional puts out a glass of water; others take it themselves. According to focus group participants, as a rule, they do not wait for the client to take the medication, but they will so do if necessary for a particular client.

² This range depends on the care process of the healthcare facility and the medication being administered. A narrow range is particularly important for people with Parkinson's disease or diabetes.

6. PROJECT ALTERNATIVE

What happens in practice if you were to utilise the medication dispenser? This is also referred to as "the project alternative." Together with your target group and the reference alternative, this forms the basis for your social business case.

6.1 Care Process

Together with the participating care organisations, we examined what the care process looked like for them when using the medication dispenser and who are involved.³

In addition to the care professional, the client, the pharmacist, the care response centre and the supplier are also involved in the care process. These parties all have their own responsibilities.

The client: At the moment the client needs medication, the device sounds a reminder. The user presses OK to release the medication from the device. The sachet opens automatically.

Care response centre: If the user does not react to the sound, someone will be notified. This can be an in-house or a contracted care response centre, or a function offered by the supplier. A direct link to the employee's team telephone is also possible. The participating parties used a contracted care response centre. They contacted the client by phone if necessary or the team in order to help the client with using the system.

The care team: The care team consists of different job profiles (including district nurses and care providers). They have different tasks:

1. Notifications and malfunctions first come into the care response centre. However, the care organisation's on-call service can also be notified if the care response centre is unable to reach the client by phone or if there is a problem that the care response centre is unable to solve. They then visit the client and resolve the issue or malfunction.
2. The medication dispenser is filled weekly or bi-weekly by a member of the care team⁴ at the relevant care organisations.
3. The district nurse determines who is eligible to receive authorisation to administer medication, informs a client about the medication dispenser and conducts a periodic evaluation of the participants.

Pharmacy: Typically, the pharmacist orders the appropriate rolls for the dispenser. The medication roll is delivered 1-2 times a week to the care organisation.

Supplier: At the participating healthcare organisations, the supplier is responsible for placing the device, installation and maintenance.

³ Note that the way in which the care process is organised can vary from one healthcare organisation to another. However, this forms the basis of the cost calculation. This is exactly why it is important to check with your own healthcare institution how the care process is structured and make your own calculations based on this.

⁴ There are also healthcare organisations that outsource this to the pharmacy.

They also monitor the dispensers continuously. The role of the supplier depends on the agreements you make as a healthcare organisation. In some instances, the installation is carried out by the care organisation itself.

The policy and innovation officer: maintains contact with the supplier and is responsible for introducing the technology within the organisation.

7. INVESTMENT COSTS

Investment costs are the costs that must be incurred before a particular technology or service (in this case, the medication dispenser) can be put into use. These are costs that will hopefully be recouped in the form of (social) earnings after a successful implementation.

These investment costs include all costs that a healthcare organisation incurs to introduce the technology within the organisation, such as the training costs of the healthcare staff and coordination with external parties, such as the supplier or the pharmacy. The costs of the medication dispenser itself and of the care response centre are also investment costs.

Three care organisations were able to provide figures on the factors listed below:

- Number of people who followed the training/instruction
- Duration of the training/instruction (in hours)
- Travel time to the training (in hours)
- Costs of hiring external party to provide the training (if applicable)
- Number of hours spent by 'internal trainers' to train colleagues to use the medicine dispenser
- Number of hours spent introducing the technology (excluding the training) within the organisation (to familiarise yourself with the technology, internal coordination, discussions with external parties including the manufacturer).
- Hourly rate

- Number of months that the medication dispenser has been implemented
- Number of clients who have since used the medication dispenser
- The costs of renting the medicine dispenser and the following-up of alarms by the care response centre, per client per month, in Euros

The calculation of the investment costs is discussed in more detail in Appendix 1. The estimated investment costs of the medication dispenser by the care organisations amounted to 100, 90 and 90 euros per client per month (rounded off to the nearest hundred).

8. BENEFITS ANALYSIS

What will the deployment of the project alternative deliver and who will benefit? By asking this question, you can clarify what the possible benefits are for each party involved. An effects diagram can help to clearly show the benefits and how they relate to one another. By organising a session with all stakeholders involved, you ensure that you get as realistic a picture as possible. It also helps to create buy-in within an organisation.

8.1 Expected Benefits

The five healthcare organisations involved shared projections and practical experience of expected benefits of using the medication dispenser. This showed that for most results there is a lack of thorough research. This means that these effects have not yet been fully demonstrated or substantiated. Therefore, in this report we speak of possible benefits instead of effects. The following possible benefits will be considered in more detail in the following paragraphs:

1. Adherence
2. Medication safety
3. Self-sufficiency
4. Sense of loneliness
5. Signalling of other problems
6. Travel time
7. Time with the client

8.2 Adherence

There are several definitions when it comes to adherence. Adherence indicates the degree to which the agreements between the patient and health care provider are adhered to. The World Health Organization (WHO) released a report indicating that promoting adherence will have a positive impact on public health (Sabaté 2003).

It is relevant to consider the extent to which the medication dispenser could contribute to adherence. In 2018, we looked at adherence to medication with the use of a medication dispenser among people living at home receiving in-house care (Neut 2019). The following statement was answered mostly positively by thirty caregivers who use the medication dispenser in their work: 'The adherence of clients who use the Medido is improved' (0% completely disagree; 0% disagree; 7% neutral; 43% agree; 50% completely agree). However, it is unknown if the comparison was made with administering medication or with the self-regulation of medication by the client.

The current published research does not reveal enough about the effect of the medication dispenser on adherence among the specific target group that normally receives medication from a healthcare professional. There has been a study that looked at the effect of the Medido with Parkinson's disease. However, an exclusion criterion for participation in the study excluded people who receive medication via home care.

Our focus group with care providers shows that the time at which the medication is dispensed can be adjusted to the daily routine of the client. One assumption is that this would make clients more inclined to take their medication than if a professional handed it to them. On the other hand, there is the assumption that the personal contact with the client by a care professional could ensure that the client takes the medication more consistently. Further research is needed to determine whether adherence increases with the use of the medication dispenser compared to the dispensing of medication by a professional.

8.3 Medication Safety

By medication safety, we are referring to the minimisation of medication-related problems, of which medication errors are an important part. Medication errors are errors in the requesting, processing, delivery, dispensing, administering or van van van monitoring of medicines.⁵ (NFU; NVZ, 2020). The following factors can contribute to improved medication safety: timely administration and administering the correct medication.

⁵ Based on the definition according to NFU (Nederlandse Vereniging van Ziekenhuizen) and the NVZ (Nederlandse Vereniging van Ziekenhuizen), broadening the definition to include the "dispensing" of medication.

Timely Administration

We expect the medication dispenser to dispense the medication more punctually than a healthcare professional, provided there are no malfunctions. The focus group participants made it clear to us that when administering medication, healthcare professionals always maintain a time frame (of +/- 2 hours) within which the medication must be administered. The medication dispenser can usually dispense more punctually. There are medications for which timely administration is of great importance to the health and well-being of the client. These include, for example, people with Parkinson's and diabetes.

The Correct Medication

It is important that medication is administered in the correct dosage. Occasionally, a medication dispenser⁶ may dispense two sachets instead of one. This happens when users press the single-use release button for too long. This can possibly lead to taking the wrong dose. However, this is not in line with expectations, since patients who are assessed by the healthcare professional as not being capable of taking their medication independently, are not given a medication dispenser (See also Chapter 4). It can also be expected that this will not be a problem in practice. Besides, healthcare professionals can also make mistakes in dispensing medication, according to focus group participants.

⁶ Medido medication dispenser

8.4 Self-Reliance

Self-reliance is the ability of people to look after themselves in all areas of life with as little professional support and care as possible (Vilans 2019). Vilans research shows that when people regain a greater sense of control over their lives, their sense of well-being increases (Jonker 2010). The question is whether self-reliance increases with the use of the medication dispenser compared to the reference alternative?

The participants of the focus group indicated that they expect self-reliance to increase because clients can independently take care of their medication and, if necessary, can also take it earlier themselves. For example, they no longer have to wait for the care giver before they undertake certain activities. However, the medication dispenser must be used with a target group that can still adequately handle the system. It is also possible that any system will malfunction or generate messages that are not properly understood by the client. All in all, we expect that self-reliance can increase with the use of the medication dispenser, provided it is used by the right client group.

8.5 Feelings of Loneliness Among Clients

63 percent of people over the age of 85 years old experience feelings of loneliness (RIVM 2019). Loneliness can be defined as "An unpleasant and intolerable perceived discrepancy between actual and desired relationships. (Gierveld 2007). Loneliness can arise from several factors. A change in or loss of social contacts, activities or work can play a role (Tilburg, Savelkoul and Hakstege 2018). Genetic factors,

health problems, personality characteristics and expectations of social contacts can also contribute (Tilburg, Savelkoul and Hakstege 2018).

Role of the healthcare professional

What is the role of the healthcare professional in a client's perceived loneliness? The QuickScan long-term care (Erbij 2014) states that the regular, daily practice in which professionals and clients have contact is perhaps the most important way to signal and follow up on (impending) loneliness. The question is to what extent does signalling and following-up of loneliness occur in relation to the dispensing of medication and whether this happens more often than would be the case if the medication dispenser were used. There is no research available on this. On the one hand one could argue that there may be less signalling and follow-up, because there are fewer contact moments. On the other hand, one could argue that the medication dispenser results in less work pressure and time constraints, leaving more time to address loneliness.

8.6 Signalling of Other Problems

In addition to loneliness, there may be other situations in practice that require signalling. For example, medical problems or the need for additional care. It is possible that this type of signalling takes place when medication is administered manually, but it does not happen, or happens to a lesser extent, when medication is administered electronically. Often the caregiver remains present for the provision of other care, as a result of which other problems can still be detected. This hypothesis could not be supported by the available literature.

8.7 Travel Time

One possible outcome of the use of medication dispensers is a saving in travel time. For the reference alternative, there is the travel time when dispensing medication. For the project alternative, there is the travel time in the event of a malfunction and when changing a dispensing roll. Appendix 2 provides an estimate of this difference in travel time at participating healthcare facilities. It is expected that the use of the medication dispenser will reduce travel time.

To calculate the required travel time per client per month for the reference alternative, it is good to consider 2 scenarios:

1. The scenario that the dispensing of medication can be combined with another care activity (combined care moment).
2. The scenario that the care professional must visit the patient separately to hand over medication (separate care moment).

The care professional does not have to spend extra travel time if administering medication can be combined with another care activity.

To make the calculation, three organisations took a sample of twenty users of the medication dispenser. The number of combined and separate care moments per day was noted. This was in the event that there was reason to revert to the old situation: the dispensing of medication by a professional.

In this estimate, the following factor could not be taken into account. In the focus group it emerged that it was expected that by eliminating the travel time for dispensing medication, other care moments could be planned more efficiently. The reason for this is that there would then be no/less need to take into account specific times when medication must be given. The route could then be planned more efficiently, which would result in less travel time at other care moments. The questionnaire inquired about this possible outcome. However, the possible effect proved difficult to quantify. Therefore, it was not included in the overview. This does not mean that the effect is not there. Respondents indicated that such an effect could indeed be expected. It is therefore possible that the estimate in Appendix 2 is understated.

8.8 Time with the client and billable care costs

An expected benefit that emerged is a saving in the time spent in providing direct care to the client. This is mainly due to the expected time saved for care professionals because manual dispensing of medication is replaced by electronic dispensing via a medication dispenser. This means that the care team needs to visit the client less often.

What Care Activities are Involved?

To calculate this yield, first list the direct care tasks of the project alternative and the reference alternative. See Table 8.1.

Table 8.1: Direct care time: reference alternative versus the project alternative

Direct care time reference alternative	Direct care time project alternative
<ul style="list-style-type: none"> administering medication 	<ul style="list-style-type: none"> placing a medication roll resolving incidents/malfunctions encouraging interaction with clients coordinating medication moments introducing technology to the client.

⁷ Bij alle berekeningen gaat het specifiek om de doelgroep met een indicatie voor medicatie aanreiken.

How Long do These Activities Take?

A second step is to estimate the duration of these activities. Appendix 3 shows the time calculations to complete care activities for the reference alternative and the project alternative.

To calculate the required time per client per month for the reference alternative, it is again good to take into account the 2 scenarios: combined and separate care moments (already discussed in 8.7).

The calculation in Appendix 3 shows that care professionals spend approximately 14-16 hours less time per client per month when the medication dispenser is used.

Billable Costs

By multiplying the time of the care activities per client per month by the hourly rate, the billable care costs per client per month can be calculated. This is the hourly rate for personal care that a care organisation can claim from the health insurer. This rate was requested per care organisation. Appendix 3 shows the calculations in which we subtracted the billable care costs of the project alternative from the billable care costs of the reference alternative. This shows that for the participating health care institutions, the estimated billable care costs of the project alternative are lower than the reference alternative⁸. In other words: with the medication dispenser, healthcare professionals spend less time per client. This leads to lower personnel costs per client.

⁸ This involves clients with a recommendation for the medication dispenser, for whom the district nurse has determined that the client in question would benefit from the use of the medication dispenser.

9. COSTS AND BENEFITS PER PARTY

In chapter 7 we described the investment costs for the care organisation when the medication dispenser is used and how these were calculated. In chapter 8 we discussed the benefits of the medication dispenser, such as the influence on adherence and self-reliance. We also explained how quantitative benefits such as non-billable care costs (travel time) and billable care costs can be calculated. The question now is: Who bears the costs and who will benefit from the quantitative returns? To provide an overview, in this chapter we list all costs and revenues for each party.

9.1 Costs and Benefits Care Organisation

Appendix 4 provides an overview of the costs and revenues for the healthcare organisation. This compares the reference alternative with the project alternative.

Investment Costs

As we have seen in Chapter 4, the deployment of the medication dispenser requires an investment to be made by healthcare organisations. They will incur costs for the rental of the medication dispenser, but also for the introduction/implementation of the technology within the organisation.

Extra Expense Claims due to eHealth Deployment

In return for these investments, there are also a number of benefits. For example, they can submit an additional monthly claim per client to the health insurer for the use of the medication dispenser.

Fewer Staff Costs

There are also fewer staff costs. We have seen in the calculation in Appendix 3 that dispensing medication via the medication dispenser takes considerably less time for the staff than manually administering medication. These staff costs per client per month were calculated by multiplying the direct time with the client by the health insurer's billable hourly rate. This amount was then reduced by a profit margin of 2%.

Fewer Claims for Staff Deployment

On the other hand, this also results in less revenue for the care provider. After all, they can claim fewer direct care hours from the health insurer for the administration of medication. On the other hand, care organisations can use their staff for other direct care activities and thus declare those hours to the health insurance company. With the current and future shortage of personnel, this can be seen as a considerable advantage for the care organisations. However, care organisations indicate that it will take some time before they have adapted their business operations to such an extent that it will also be beneficial to them.

Weighing Costs and Revenues

If we weigh all costs and revenues against each other, the picture emerges that the ratio of costs to revenues for healthcare organisations is more or less balanced and on average slightly above zero. Based on the current results, it appears that the participating

care organisations that invested in a medication dispenser receive a relatively small financial benefit from this. The small differences between them depend on the exact investment costs per organisation, their financial agreements with the health insurance company and the degree of efficiency (profit margin) per organisation. The investment costs of the healthcare organisations involved are either barely compensated or not compensated at all by the contribution they receive for this from the health insurer. In addition, we see that the healthcare organisations involved incur fewer costs for the deployment of personnel.

9.2 Costs and Revenues Health Insurance

In the Netherlands, care is arranged in such a way that we take care of each other and bear the costs through health insurance. The lower we can keep these costs, the lower the costs for society will be. In the previous section we saw what the costs and returns are for the healthcare organisation. Revenue for healthcare organisations constitutes costs for healthcare insurers. Costs for the health insurer are in turn costs for society. In Appendix 5, we provide an estimate of the costs and revenues for the health insurer, compared to the reference alternative.

The health insurer usually does not incur investment costs. They usually do not pay for the rent of the medication dispenser and the introduction of the technology within the organisation. However, the health insurer does pay an additional claim per client per month to the care organisation for the use of the medication dispenser.

On the other hand, the number and amount of care expense claims is reduced because dispensing medication via the medicine dispenser takes less time for the care professional.

If we weigh up the quantitative costs and revenues, we see that the use of the medication dispenser - in financial terms - is positive for the health insurance company: a benefit of approximately 800 euros per client per month (see Appendix 5).

9.3 Social Business Case

What is the result when you add up all the costs and quantitative benefits of all the parties? The use of the medication dispenser provides a total benefit of around 800 euros per client per month (rounded off to the nearest hundred). It should be noted that the medication dispenser also has a number of qualitative benefits, as described in Chapter 8. In the absence of impact studies, these could not be quantified and included in the calculations. Of course, this does not mean that these revenues are not there.

10. SENSITIVITY ANALYSIS

To justify the degree of accuracy of the inputs to the calculations and the outcomes, we performed a sensitivity analysis. For the sBC of the medication dispenser, we tested the extent to which a real change in some 14 factors affects the final outcome of the social business case, the business case of the healthcare organisation and the business case of the health insurer (see appendix 7).

10.1 Social Business Case

The sensitivity analysis provides insight into the factors that would have the greatest impact on the sBC in the event of an actual adjustment. In total, the input values were changed for 14 factors. Two alternative values per factor were used as input. For none of the values was the sBC negative. This means that it can be stated with a fairly high degree of certainty that the (social) business case is positive.

Factors that had a large influence (>10% difference) on the outcome of the sBC are: hourly rate of a care team member, external; average number of minutes combined care moment; average number of minutes separate care moment; average number of separate care moments per client per day. Therefore, adjusting these values has the most influence on the outcomes of the social business case.

10.2 Care Organisation

For 12 of the 14 factors, adjusting the values did not result in a negative business case outcome for the healthcare organisation. Entering an alternative value for 2 factors resulted in a negative business case. The first relates to a profit margin of the healthcare organisation of 4% instead of 2%. The second relates to an adjustment in the reimbursement from the health insurance company for the use of the medication dispenser, namely 108 euros per client per month instead of 126 euros. Of course, this does not mean that the BC would be negative with a profit margin of 4% and a reimbursement from the health insurance company of 126 euros. After all, the input values of other factors can compensate for this.

Factors that had a large influence (>10% difference) on the outcome of the BC for the care organisation in case of a real adjustment were: profit margin of care organisations; hourly rate of a member of the care team, external; average number of minutes combined care moment; average number of combined care moments per client per day; average number of minutes separate care moment; average number of separate care moments per client per day; reimbursement by health insurance company for use of medication dispenser per client per month. Thus, influencing these values has the most impact on the outcomes of the business case.

⁹ Deze alternatieve waarden zijn gebaseerd op het gemiddelde +/- de standaarddeviatie.

10.3 Health Insurer

We also performed a sensitivity analysis for the health insurer (see Appendix 7). Again, we adjusted the 14 input values and examined the extent to which this affected the outcome of the BC for the health insurer. At none of the alternative values did the business case for the health insurer become negative. Factors that had a large influence (>10% difference) on the outcome of the business case for the health insurance company are: hourly rate of a member of the care team, external; average number of minutes combined care moment; average number of minutes separate care moment; average number of separate care moments per client per day. Influencing these values seems to have the most impact on the outcomes of the business case.

11. CONCLUSION

Vilans has conducted an exploratory study to gain insight into the design and implementation of a social Business Case.

The results form a first assessment of the potential costs and benefits of the medication dispenser, which we compared with the dispensing of medication by the care professional. We specifically looked at the target group with a pre-established need for the administration of medication, whereby the district nurse estimates that the client in question will benefit from the medication dispenser.

With the deployment of the medication dispenser, an investment is made by care organisations. They incur costs by introducing the technology within the organisation, including training and implementation costs. These investments are also offset by a range of (social) benefits for various parties.

Based on a literature study and a focus group with the stakeholders involved, insight was gained into the possible qualitative benefits of using the medication dispenser for the client. Effects are expected in the area of adherence, medication safety, self-reliance, loneliness and the identification of other problems. Based on the available literature it is not yet possible to substantiate the extent of the relationship and whether it is positive, neutral or negative.

The results of the current study show that the travel time of the care professional can be reduced with the use of the medication dispenser

by 3-5 hours per client per month. The medication dispenser further possibly contributes to a decrease in direct time with the client (based on the current research estimated to be about 14-16 hours per client month).

As a result, the billable expenses may decrease with ± 800 euro per client per month. Next, we looked at who might benefit from these returns. For the care institutions the BC seems to be neutral-positive: ± 10 euro per client per month (based on averages from 3 participating care organisations, excluding the qualitative returns). The business case for the health insurance company is positive: + 800 Euros per client per month (based on averages of 3 participating care organisations, rounded to the nearest hundred). The sensitivity analysis showed that at no alternative value did the business case for the health insurance company become negative. Because we found the quantitative returns quite high, all outcomes were presented to the care organisations. They estimated that the amounts of this sBC are real amounts.

This case study of the medication dispenser, together with the case studies of day-structure robots and smart key solutions, should be seen as exploratory studies aimed at showing how to prepare a sBC. This has made it possible for us to compile a number of focus areas and recommendations. Creating a sBC provides insight into the costs and benefits of eHealth..

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COLOPHON

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APPENDIX 1: CALCULATION EXAMPLES INVESTMENT COSTS

1.1 Formulae

The investment costs for the care organisation consists of:

1. The costs of implementing the medication dispenser within the organisation.
2. The cost of renting the medication dispenser and contracting the care response center.

The investment costs can be calculated by entering data D1t/mD8 from the table below in the formulae below.

A=B+C

A= Total investment costs, per client per month.

B= The cost of implementing the medication dispenser within the organisation, per client per month.

C= The costs of renting the medication dispenser and the follow-up of alarms by the care response centre , per client per month.

$B = (D1 * (D2 + D3) * D7 + D4 + ((D5 + D6) * D7)) / D8 / D9$

1.2 Required Data

		Org 1	Org 2	Org 3
D1	Number of people who have followed the training / instruction.	1000	400	20
D2	Duration of the training (in hours)	1	0,6	1
D3	Travel time to the training (in hours).	0	0,7	0,2
D4	Cost of hiring the person giving the training (if applicable).	0	0	0
D5	Number of hours spent by 'internal trainer' to train colleagues in using the medication dispenser.	900	0	30
D6	Number of hours spent on the introduction of the technology (excluding training) within the organisation (on orientation on technology, internal alignment, conversations with external parties including supplier).	200	208	273
D7	Hourly rate	63	60	57
D8	Number of months medication dispenser implemented.	69	26	25
D9	Number of clients using the medication dispenser since then.	541	222	92
C	The costs in euros of renting the medication dispenser and the follow-up of alarms by the care response center, per client per month.	99	81	83

1.3 Calculation

If the data are put into these formulae, an estimate of the investment costs (=A) within the participating healthcare organisations can be given. This is rounded off to the nearest 10: Org1: A= €100,- Org2: A=€90,- Org3: A=€90,-.

APPENDIX 2: CALCULATION EXAMPLE OF TRAVEL TIME

2.1 Travel Time Reference Alternative

Formula

The travel time of the reference alternative (=G) can be calculated by entering the data G1 and G2 from the table below in the formula below:

$$G=(G1*G2*30 \text{ days})/60 \text{ minutes}$$

Required Data

Two healthcare organisations provided sufficient data via the questionnaire, to be able to make a calculation.

		Org 1	Org 3
G1	Number of contacts on average per client per day, which cannot be combined with other care.	2,0	2,5
G2	Travel time when providing medication (in minutes).	4	5

Calculation

		Org 1	Org 3
G	Estimate travel time reference alternative, per client per month, in hours.	4,0	6,2

2.2 Travel Time Project Alternative

Formula

The travel time of the project alternative (=H) can be calculated by entering the data H1 to H4 from the table below in the formula below:

$$H = (H1 * H2 + H3 * H4) / 60_{\text{minutes}}$$

Required data

Three healthcare organisations supplied sufficient data via the questionnaire, to be able to make a calculation.

		Org 1	Org 3
H1	Estimate of average number of malfunctions caught by the healthcare professional (per client per month).	2,5	1,5
H2	Average travel time in minutes in case of a malfunction (in minutes).	20*	20
H3	Average travel time in minutes to change a dispensing roll.	4	5
H4	Average number of changes (per client per month)	3	3

* The data with an asterisk is missing data. In order to be able to make a calculation, an average of the data from the other healthcare organisations was used.

Calculation

Applying the data from these formulae produces a travel time per client per month as follows:

		Org 1	Org 3
H	Estimate travel time project alternative, per client per month, in hours.	1,0	0,8

2.3 Difference in travel time

	Org 1	Org 3
Travel time reference alternative, per client per month, in hours.	4,0	6,2
Travel time project alternative, per client per month, in hours.	1,0	0,8
Estimated average travel time, in hours	3,0	5,4

APPENDIX 3: CALCULATION EXAMPLE OF TIME WITH THE CLIENT AND BILLABLE EXPENSES

3.1 Reference alternative

Formula

The billable expenses of the reference alternative consist of the personnel costs of administering medication. These personnel costs can be calculated by using the following formula:

$$DZR = TZR * E5$$

DZR= Estimated billable healthcare costs of the reference alternative, per client per month in euros.

TZR= Estimated average time of care activities of the reference alternative per client per month, in hours

With $TZR = ((E1 * E2) + (E3 * E4)) * (30_{days} / 60_{minutes} = 1/2) = 1/2((E1 * E2) + (E3 * E4))$.

Required data

		Org 1	Org 3
E1	Average number of minutes combined care moment.	5	5
E2	Average number of combined care moments per client per day.	1.0 ¹⁾	1.7 ¹⁾
E3	Average number of minutes of separate care moment.	12.5	10
E4	Average number of separate care moments per client per day.	2.0 ¹⁾	2.5 ¹⁾
E5	Hourly rate member of the care team.	65	59

1) These figures are based on an average of a random sample of 20 users of the relevant healthcare organisation.

Calculation:

If the data E1 to E5 are entered in the formulae, the following estimates are given:

		Org 1	Org 3
TZR	Estimated average time of care operations of the reference alternative per client per month, in hours.	15,1	16,6
DZR	Estimated billable healthcare costs of the reference alternative, per client per month in euros.	973	974

3.2 Project Alternative

Formula

The care costs of the project alternative that can be declared, consist of the personnel costs when using the medication dispenser. These personnel costs can be calculated using the following formula:

$$DZP = TRP * F1 + F2$$

DZP = Estimated billable care costs of the project alternative, per client per month in euros.

TZP = Estimated average time of care moments of the project alternative per client per month, in hours.

With $TZP = ((F3 + (F4 * F5) + F6) + (F7 + F8)) / F9 / 60_{\text{minutes}}$.

Required data

Three healthcare organisations provided sufficient data via the questionnaire to be able to make a calculation.

		Org 1	Org 2	Org 3
F1	Hourly rate member of the care team in euros.	64,6	61.5*	58,5
F2	Reimbursement of health insurer: use of medication dispenser per client per month.	115,4	116,0	146,2
F3	Scheduled time per client per month for placing the dispensing roll in the medication dispenser by the care team (in minutes).	50	40	30
F4	Time that a healthcare professional spends on average on fixing 1 malfunction, excluding travel time (in minutes).	10*	10	10
F5	Number of malfunctions on average per client per month, which are resolved by the healthcare professional.	2,5	1,0	1,5
F6	Time spent by a healthcare professional on average per client per month encouraging the client to use the medication dispenser. (in minutes).	5,0	4,3	5,0
F7	Time spent by a member of the care team per client setting the times of medication delivery (in minutes).	7,5	5,0	6,3*
F8	Time spent by a district nurse per client, providing information about the medication dispenser and how it works (in minutes).	60	60	30
F9	The average useful life in months of the drug dispenser.	14	11*	8,0

*) The data with an Asterisk is missing data. In order to be able to make a calculation, an average of the data of the other healthcare organisations was used.

APPENDIX 4: ESTIMATED COSTS AND REVENUES OF CARE ORGANISATION

All amounts (in euros) are an estimate, rounded to the nearest tens, displayed per client per month. These are specifically clients who require medication.

Costs Care Organisation

	Org1	Org2
Investment costs: rent medication dispenser		
Reference Alternative	0	0
Project Alternative	-99	-81
<i>Difference (project alternative -/- reference alternative)</i>	-99	-81
Investment costs: Introduction Costs		
Reference Alternative	0	0
Project Alternative	-4	-7
<i>Difference (Project alternative-/- Reference alternative)</i>	-4	-7
Total Costs Care Organisation	-103	-89

Returns Care Organisation

	Org1	Org2
Reduced personnel costs		
Reference alternative	-953	-956*
Project alternative	-89	-61*
<i>Difference (Project alternative -/- Reference alternative)</i>	864	895*
Fewer claims for staff deployment (revenues)		
Reference alternative	972	985*
Project alternative	91	62*
<i>Difference (project alternative -/- reference alternative)</i>	-881	-923*

Additional claim for eHealth deployment

Reference alternative

0

0

Project alternative

115

116

Difference (Project alternative -/- Reference alternative)

115

116

Total Returns Care Organisation

98

89

Revenues Minus Costs

Total revenues -/- costs rounded to tens (in euros)

-10

0

* The data with an asterisk is missing data. In order to be able to make a calculation, an average of the data of the other healthcare organisations was used.

APPENDIX 5: ESTIMATED COSTS AND REVENUES OF HEALTH INSUR

All amounts (in euros) are an estimate, displayed per client per month. These are specifically clients who require medication. Because there are no costs for the health insurer, these costs are 0 euros.

Costs Health Insurer

	Org1
Investment costs: rent medication dispenser	
Reference alternative	0
Project alternative	0
<i>Difference (project alternative -/- reference alternative)</i>	0
Investment costs: introduction costs	
Reference alternative	0
Project alternative	0
<i>Difference (project alternative -/- reference alternative)</i>	0
Total Costs Health Insurer	0

Revenues Health Insurer	
	Org1
Fewer claims staff deployment	
Reference alternative	-972
Project alternative	-91
Difference (project alternative -/- reference alternative)	881
Extra claims as a result of eHealth deployment	
Reference alternative	0
Project alternative	-115
Difference (project alternative -/- reference alternative)	-115
Total Revenues	766
Revenues minus costs	770

APPENDIX 6: TOTAL OVERVIEW

All amounts (in euros) are an estimate, shown per client per month. This specifically refers to clients requiring medication.

Total Expenses

	Org1	Org2	Org3	Average
Total expenses healthcare organisation	-103	-89	-91	-94
Total expenses health insurer	0	0	0	0
Total expenses deployment medication dispenser	-103	-89	-91	-94

Total Expenses

Total revenue healthcare organisation	98	89	128	105
Total revenue health insurer	766	807	774	782
Total revenue	864	895	902	887
Total revenue -/- expenses	761	807	811	793

Difference

Total revenues -/- expenses rounded off to the nearest hundred (in Euros)	800	800	800	800
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APPENDIX 7: SENSITIVITY ANALYSIS

In this sensitivity analysis, 3 different values are introduced for 14 factors. These values are:

1. Value used: The "value used" comes from the average of the 3 organisations that provided enough data to make a full calculation.
2. Alternative value 1 and 2: This adjusted value is based on values coming from all 5 organisations that provided values +/- the standard deviation. For 'Hourly rate of a member of the care team, external' the maximum rates of the Dutch Healthcare Authority (NZa) of 2019 have also been taken into account. For an estimation of the profit margins of the care organisations, expert Judgement by ActiZ and literature (Gupta Strategists March 13, 2017) were used.

When adjusting 1 factor, the other factors are kept constant.

factor	waarde	input	uitkomst mBC	uitkomst zorg-organisatie	uitkomst zorg-verzekeraar
Profit margin for care organisations.	Alternative value 1	0	811	28	782
	Value used	2	793	10	782
	Alternative value 2	4	775	-8	782
Hourly rate of a member of the care team, external. (A member of a care team can be a district nurse, a caregiver or a caregiver of another level working within GKT.)	Alternative value	56	712	13	699
	Value used	62	793	10	782
	Alternative value 2	64	831	9	822
Average number of minutes of combined care. (The number of minutes it takes to administer medication if medication administration can be combined with other care.)	Alternative value 1	3	713	12	701
	Value used	5	793	10	782
	Alternative value 2	7	872	9	863
Average number combined care moments per client per day	Alternative value 1	1,0	745	11	733
	Value used	1,3	793	10	782
	Alternative value 2	1,8	865	9	856
Average number of minutes separate care moment. (The number of minutes it takes to administer medication when separate care visits are required by the healthcare professional).	Alternative value 1	9,4	674	16	658
	Value used	11,3	793	10	782
	Alternative value 2	11,8	836	13	824
Average number of separate care moments per client per day.	Alternative value 1	0,8	310	23	286
	Value used	2,3	793	10	782
	Alternative value 2	2,8	991	9	981
Reimbursement from health insurance company for use of a medication dispenser per client per month. (The amount the health insurance company pays per client per month for the use of the medication dispenser).	Alternative value 1	108	793	-7	800
	Value used	126	793	10	782
	Alternative value 2	144	793	28	765

Scheduled time per client per month for the care team to place the dispensing roll in the Medication Dispenser (in minutes).	Alternative value 1	25	808	10	798
	Value used	40	793	10	782
	Alternative value 2	47	786	10	775
Time spent by a healthcare professional on average to resolve 1 malfunction, excluding travel time (in minutes).	Alternative value 1	8	796	10	785
	Value used	10	793	10	782
	Alternative value 2	18	779	11	768
Number of malfunctions on average per client per month, which are resolved by the care professional.	Alternative value 1	0,8	802	10	791
	Value used	1,7	793	10	782
	Alternative value 2	2,2	787	10	777
Time spent by a healthcare professional on average per client per month encouraging the client to use the medication dispenser to interact (in minutes).	Alternative value 1	2,7	795	10	784
	Value used	4,8	793	10	782
	Alternative value 2	5,5	792	10	782
Time spent by a member of the care team per client to set medication dispensing times.	Alternative value 1	5,2	793	10	782
	Value used	6,3	793	10	782
	Alternative value 2	8,1	793	10	782
Time that a district nurse spends per client informing the client about the medication dispenser and giving the first instructions (in minutes).	Alternative value 1	21,9	795	10	785
	Value used	50,0	793	10	782
	Alternative value 2	63,1	791	10	781
The average time spent using the medication dispenser	Alternative value 1	6,8	789	10	779
	Value used	11,0	793	10	782
	Alternative value 2	15,2	794	10	784