

31 Mai 2017 Report on quantitative analysis

PROTOCOLE 3



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Chapter 1. Methods

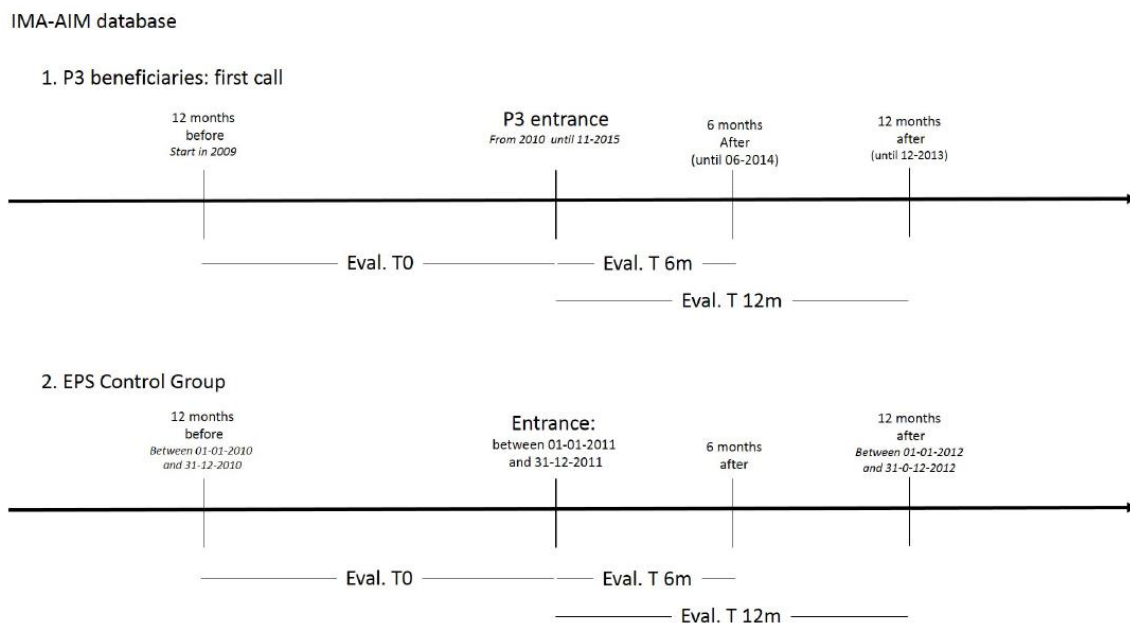
1. Data collection

As explained in the integrated report of the first call, two sources of data were used and linked to identify beneficiaries for the projects: the IMA-AIM database and the data collected from the BeIRAI website. The variables were selected from the IMA-AIM database and the InterRAI HC instrument based on a literature review and expert opinion. As a result of the literature review, we selected the items that were most frequently used in the evaluation of interventions aimed at keeping frail older persons at home. Expert opinion was used to identify proxies of health care consumption.

1.1. The IMA-AIM database

The IMA-AIM database is an official government database (from an intermutualistic agency) that records all reimbursed health care per individual. The IMA-AIM data are available for the P3 beneficiaries, for a control group recruited by nursing home services, and also for the permanent sample (EPS), a random sample of 120 000 persons older than 65 years. These health care consumption characteristics were identified by the health care consumption proxies available in the IMA-AIM database and linked to the main outcome of P3 (the risk of definitive institutionalization). First, these proxies were selected by experts according to chronic care needs. Some of the proxies were defined in relation to the consumption of healthcare over a period of time (for example, medication must be taken for more than three months in a given year to qualify as chronic medication). For that reason, a one-year period of observation was necessary before inclusion in a P3 project to determine the presence or absence of proxies. In the second step, a univariate test was computed between the risk of institutionalization and the proxy. Finally, a correlation test was computed for all significant variables. Only proxies containing the most information were retained (continuous variables versus binary variables). The IMA-AIM database also provided the main outcome variable, i.e., definitive institutionalization, defined as a stay of 90 consecutive days (with less than four days between two stays) in a nursing home (directly provided by the IMA-AIM as precise dates were not authorized for privacy reasons). Other outcomes are also available in the IMA-AIM database, including death, out-of-hours GP visits, use of emergency services.

Figure 1 Time line of the IMA-AIM database



1.2. BelRAI database

The InterRAI HC instrument is an internationally validated instrument measuring several domains, including cognitive functioning, ADL, social and psychological well being, health status, environmental characteristics, etc. The BelRAI database contains the interRAI HC instrument data (including ADLh scale to measure a person's functional performance in ADL; IADLp scale to measure a person's functional performance in IADL; CPS2 scale that describes a person's cognitive status; Depression scale (DRS) used as a clinical screening tool for depression) and data from other scales, such as the Zarit Burden interview (to measure ICG burden, of which we used the short, 12-item version or ZBI-12), the WHO-QoL-8 (to measure client's perceived generic quality of life) and an ad-hoc economic questionnaire (to measure the intensity of utilization of health and social care services at home, e.g., meals on wheels, household help... and the time spent on IC for one or two main informal caregivers). Some of these scales were dichotomised, using a validated cutoff (3 for ADL, CPS (Paquay et al., 2007) and DRS (Burrows et al., 2000); 24 for IADLp; more than 0 for behavioural problems and 10 for ZBI-12 (O'Rourke and Tuokko, 2003).

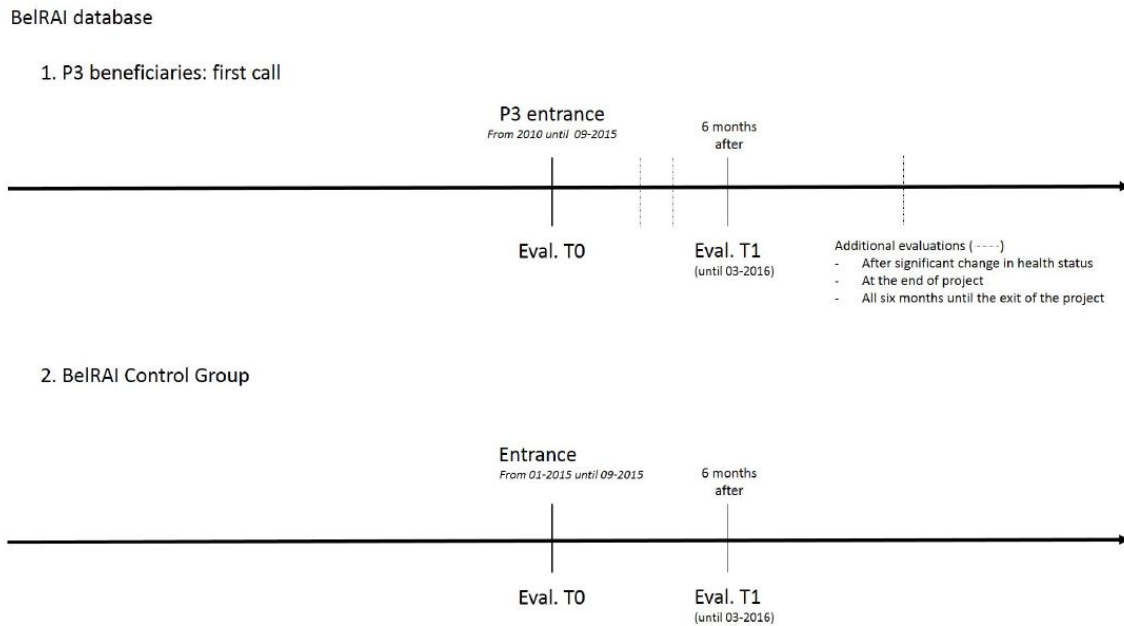
Professional caregivers were asked to complete these instruments at the time of inclusion of the frail older person in the project (baseline), at exit from the project, 6 months after baseline unless the person no longer lived at home (even if the older person was no longer in the project) and if there was any significant change in health status. Additionally, if persons stayed in the project for more than 6 months, professional caregivers had to conduct a follow-up every 6 months until the subject left the project. Therefore, the subject follow-up period varied between six to 36 months. Criteria for exiting the project were: no longer receiving services from the project, institutionalization for longer than 3 months, or death. The BelRAI database was available for P3 beneficiaries and for a control group recruited by nursing home services (BelRAI CG). The time lines below summarize the different evaluations. Some inclusion criteria were used to target the beneficiaries before the first evaluation of the BelRAI. Only frail older people living at home were allowed to benefit from the intervention (Royal

Chapter 1 Methods

1 Data collection

Decree of 02.07.2009). According to this Royal Decree, the following inclusion criteria were used: age 60 years or older AND with a score on the Edmonton Frail Scale (ref 17, 18 in the report) of 6 or more OR having a dependence status of A, B or C assessed using a Katz score (home scale) OR B, C or Cd (residential scale) OR with diagnosis of dementia made by a geriatrician, neurologist or psychiatrist. The same inclusion criteria were used for the BelRAI CG.

Figure 2 Time line of the data collection of BelRAI database



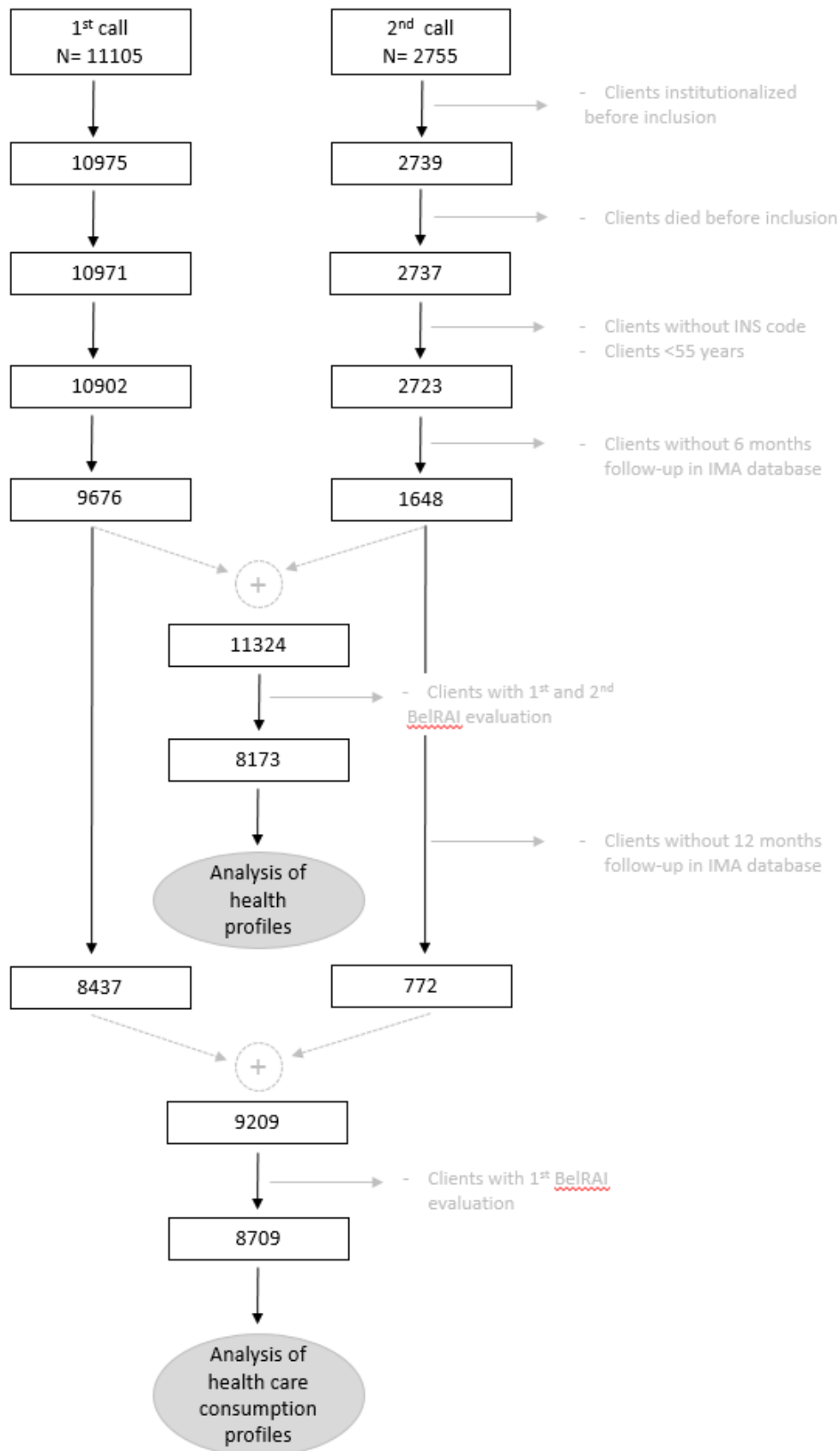
1.2.1. Database overview

Table 1 Description of database available for the three samples used in the analysis

	P3 beneficiaries	BelRAI CG	EPS CG
Characteristics of population	- Elderly (>60 years) - Frail (Edmonton scale >6, OR status of dependence A, B or C on Katz scale, OR dementia diagnosis made by specialist)	- idem P3 beneficiaries	- Representative sample of Belgian elderly (>65 years) population
Individuals	P3 beneficiaries	Subjects recruited by nursing home services	Subjects from permanent sample
Databases	- Evaluation of beneficiary: InterRAI-HC instrument (Scale of health: ADL, IADL, CPS, DRS, disturbed behaviour) - IMA database: database of intermutualistic Agency (health care costs reimbursed by NIHDI) - Economic questionnaire + informal care + social care services	- Evaluation of subjects: InterRAI-HC instrument (Scale of health: ADL, IADL, CPS, DRS, disturbed behaviour) - IMA database : database of intermutualistic Agency (health care costs reimbursed by NIHDI) - Economic questionnaire + informal care + social care services	- IMA database : Permanent sample from intermutualistic Agency (health care costs reimbursed by NIHDI)
Matching between intervention and control group on		BelRAI scales	IMA proxies

The flow chart hereafter presents the number of clients included in the different parts of the evaluation.

Figure 3 Flow chart of the number of beneficiaries included in the different analysis



1.3. Data collection for the two control groups used

The aim the elaboration of two control groups was to have a comparator for frail older persons benefitting from "usual care".

The control group recruited by home care organisations (BelRAI CG). This control group has allowed the evaluation of the consequences on:

- the clinical outcome
- the use of services
- the costs.

With the control group BelRAI, the evaluation was done in two parts with two different samples:

- the evaluation of the consequences on the use of services and on the costs was based on the sample of all clients having at least a first BelRAI evaluation and matching with the IMA database. A follow-up of six months was necessary in the IMA database to include the clients in this sample. In this sample, the clients who were institutionalized or died in the period of follow-up, were included.
- the evaluation of clinical outcomes was based on the sample of clients having a first and a second BelRAI evaluation. This means that the evaluation of clinical outcome includes exclusively clients not institutionalized and not deceased. These clients probably were less dependent or frail than the clients who were institutionalized or who died. It is important to keep this in mind while interpreting the results on the clinical outcome. (in the flow chart named: analysis on disability profiles).

The control group extracted from the permanent sample (EPS CG). This control group has allowed the evaluation of the consequences on the use of services and on the costs. With this control group EPS, the evaluation was done with one sample

The evaluation of the consequences on the use of services and on the costs was done with the client having a first BelRAI evaluation and matching with IMA database. A follow-up of twelve months is necessary in the IMA database to include the clients benefitting from interventions in this sample. (in the flow chart named: analysis on the health care consumption profile).

2. Stratification of the target population

For evaluation purposes, it was important to identify the best "fit" between population characteristics (stratified in subgroups) and the intervention. For example, an occupational therapy project would be expected to have more impact on persons with functional difficulties than in those with behavioural disturbances. This intervention should also have more impact after a hospitalization or an important change in the health status of the subject.

It is possible to stratify populations by using variables from the two databases.

For the BelRAI database, the scales give an indication of the functional, cognitive, depressive or behavioural problems of the subject. It is then possible to define different disability profiles by combining the scores on the different scales. Indeed, if only one scale is used, there is a risk that an important aspect of the subject's health problem would be omitted. Therefore, target populations were identified using statistical methods to aggregate the different scales so as to answer the following questions: Do natural groups exist in terms of clinical scales among the beneficiaries? Do these groups have a correct and clinical classification? Can these groups help us identify different strata within the population?

For the IMA-AIM database, the same approach was investigated by using the combination of the different IMA proxies in order to identify the target populations. This approach did not enable identification of individuals in the permanent sample who had the same level of frailty as the P3 beneficiaries. Hence, target populations were identified from important healthcare consumptions occurring in the year before inclusion in a P3 intervention. The beneficiaries were classified into five groups according to the presence or absence of three types of event: (a) the use of nursing care at home; (b) hospitalization; and (c) short term institutionalization in a nursing home.

Two types of stratification were therefore realized. The first was based on disability profiles using BelRAI scales and the second on health care consumption patterns using IMA data.

2.1. Stratification based on the disability profile

In order to identify specific groups of population that could have specific needs of home support, we identified natural clustering of individuals with a similar disability level in the intervention arm, using statistical analysis frequently employed for the building of classification schemes [13]. These groups were built by the combination of the scores for the functional limitations, the cognitive performance and the presence of behavioural troubles. The analysis was performed in two steps. First, a Principal Component Analysis (PCA) (i.e. a spectral decomposition of the correlation matrix) was computed to reduce data which enables to place explanatory variables on a unified scale. Second, a clustering analysis was performed on the basis of the PCA correlation matrix. Using the structure of the cloud of points, the natural groups can therefore be determined. A hierarchical algorithm (Ward algorithm) was used to define the number of groups by the decomposition of the inertia of the cloud of points and the minimization of the loss of information at each new clustering. The number of groups is a compromise between having similar individuals within a group, and having groups with important differences. This method is explained in detail in chapter 14 of (Trevor et al., 2009) and was computed using the package (Husson et al., 2015) in R.

2.2. Stratification based on the historic healthcare consumption

A stratification method was used to create the healthcare consumption profiles. The criteria for the stratification were chosen at the entry-point within the P3 project. These were the organisation of nursing care at home, hospitalisation or a short stay in a nursing home. The criteria used were the following:

- Nursing care: Nursing care at home at least twice a week for at least three months during the year before P3 inclusion.

- Hospitalisation: Hospitalisation (more than one day) in the two months prior to P3 inclusion and one or more other hospitalisations (more than one day) during the year prior to P3 inclusion.
- Short stay in nursing home (for respite care): A nursing home stay shorter than 90 days and not preceded by a hospitalisation in the previous two months.

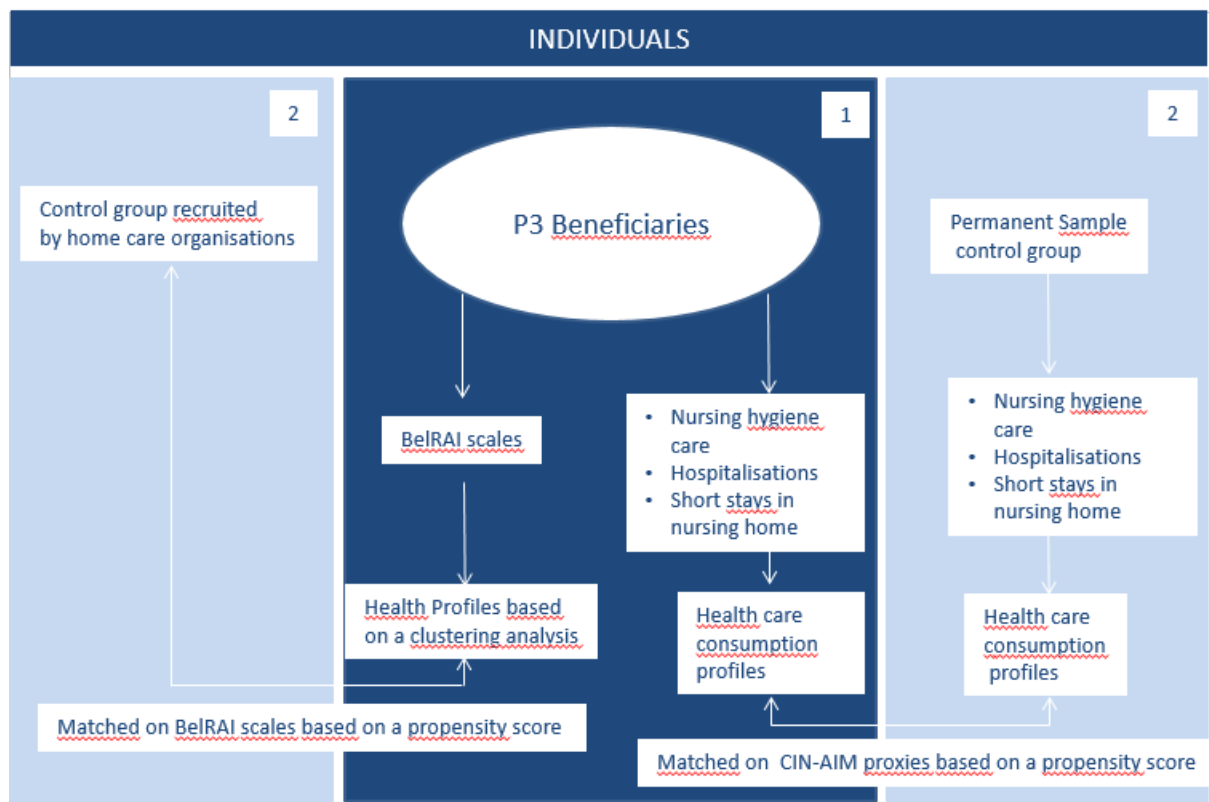
3. Building the two control groups

To evaluate the effects of the interventions, the outcome of the P3 beneficiaries had to be compared to that of a group without interventions representing as much as possible “usual care”. This group had to have the same characteristics as P3 beneficiaries to ensure that the difference between the groups was statistically associated with the intervention. The statistical method used to build the control group enabled identification of an individual in the control group with similar characteristics to an individual in the intervention group, for each P3 beneficiary. Each P3 beneficiary was thus paired with one control individual.

Two different comparison groups were created. The first group consisted of individuals recruited by the nursing home services (i.e., BelRAI CG). For this sample, the BelRAI database and the IMA-AIM database were available. The second group was constructed using the permanent sample (i.e., EPS CG). Only the AIM-IMA database was available for this group. The outcome variables of these two groups were different. The BelRAI control group provided an answer to the following question: Is there a difference between beneficiaries and the control group in terms of BelRAI scales after the intervention? The second group permitted analysis of the risk of institutionalizations, of the risk of death and of health care consumption outcomes, such as out-of-hours GP visits, unplanned hospitalizations (assessed only when a consultation with the emergency services was followed by hospitalisation).

As explained in the first report (March 2016), both approaches have limitations. The first group was recruited only by nursing home services, so these persons were likely to already be benefitting from an intervention. Keeping this in mind, the clinical data can, nevertheless, be used for matching and comparison. The second group was similar to P3 beneficiaries in terms of health care consumption, but we cannot be sure that they shared a similar clinical profile.

Figure 4 Summary of the methods of stratification and matching



3.1. Control group for the disability profile stratification

The constitution of a control arm was done by matching one P3 beneficiary with one individual, from the control arm, having similar level of presence of informal caregiver (enabling factor) and maximum similitude for the scores on the clinical scales, and for the predisposing factor (age, sex). The statistical matching technique used was the propensity score, which was estimated using a regression logistic model, in which the dependent variable was a binary variable (treated/control).

The following steps were computed for the building of the control group:

Two successive stratifications

The P3 intervention arm and the control arm were stratified by level of presence of informal caregiver (without, non-cohabitant and cohabitant). For two main reasons, we use this preliminary step before the matching to impose this variable as similar between intervention and control arms. First, elderly people with a co-resident informal caregiver were frailer than either those without ICG or those with a non-resident ICG (Cès et al., 2017b). Second, the level of utilization of health and social services depends on the family relationship of the informal caregiver (Bonsang, 2009). Each level of presence of the informal caregiver of the intervention arm is then stratified by dependency levels. One model of propensity score was created for each of these subgroups.

The selection of variables, for each model of propensity score, among the BelRAI scales (ADL, IADL, CPS, DRS, presence of behavioural problems)

As required by (Caliendo and Kopeinig, 2008), the propensity score model was built step by step with inclusion of a new variable at each step. The new variable was retained if the likelihood ratio test (G_2) was statistically significant. The G_2 was computed as the difference of likelihood between the current model and the previous model. The G_2 follows a Chi-squared distribution with the degree of freedom equal to the difference in the parameter number between the two models.

The matching on the propensity score

The matching function used was the method of the nearest neighbours with one to one matching and with replacement. The replacement enabled the best match to be found for a beneficiary among all potential control individuals. It was mandatory in our case because of the small number of individuals in the control group and was computed by the package Matching in R, described by (Sekhon, 2011).

The evaluation of the covariate balance

The standardised mean difference (SMD) was computed for each covariate (higher than 0.1 according to (Normand et al., 2001) and 0.25 according to (Rubin, 2001) indicated imbalance). The average SMD summarises the SMD for multiple covariates (Linden and Samuels, 2013). A higher value of average SMD indicates greater imbalance (Linden and Samuels, 2013). The Variance Ratio (VR) was defined as the ratio of variance of the covariate in the treated and in the control group. And the analogous variance ratio (VR_{max}) is always greater than 1 and is the ratio of the maximum variance of covariate and the minimum variance of covariate between treated and control groups. The Variance ratios of multiple covariates are computed from the VR_{max} by the Geometric Mean Variance Ratio (GMVR) (Linden and Samuels, 2013), which always has a value greater than 1, but a value greater than 2 indicates imbalance.

3.2. Control group for the historic healthcare consumption profile stratification

It has to be stressed that the P3 sample differed markedly from the permanent sample. The individuals of the permanent sample were, on average, younger and healthier than the P3 beneficiaries. In order to use the permanent sample as a control group, the frailest individuals in the permanent sample had to be identified to resemble the P3 beneficiaries. The identification of these individuals was possible only using the AIM-IMA proxies.

Hence, the matching model allowed for the identification of individuals in the permanent sample who had health care consumptions closest to those of the P3 beneficiaries.

Stratification

The P3 intervention arm and the permanent sample were stratified on the historic healthcare consumption. One model of propensity score was created per each of these subgroups.

The selection variables, for each model of propensity score, among the AIM-IMA proxies (described in Appendix).

A similar method as for the disability profile control group was used to select the variables.

The matching on the propensity score

Similar matching method was used but it was realized on the AMI-IMA proxies.

The evaluation of the covariate balance

The covariate balance was computed (by method described for the disability profile control group).

4. Evaluation of the consequences of the interventions on the clinical outcomes and the healthcare consumptions.

The evaluation of the consequences depended on the control group used.

- With the disability profile control group, the evaluation of the consequence on the clinical outcomes and on the healthcare consumptions was possible. It should be borne in mind, however that the beneficiaries and the control group have a similar disability profile but not necessary similar historic healthcare consumption. This point was reinforced by the recruitment of the control group which was done exclusively by home nursing care services.
- With the historic healthcare consumption profile, only the consequences on the utilization of services can be evaluated. However, the intervention and the control groups had similar healthcare consumption at inclusion in the study.

4.1. Consequences on the clinical scales

4.1.1. Selection of the clinical scales evaluated

The selection of the clinical outcomes depended on the type of intervention evaluated. The table presents the clinical outcome evaluated depend on the type of intervention.

	IADL	ADL	Falls	DRS	Loneliness	WHOQOL score	Zarit
CM	x	X	X	x		x	x
OT	x	X	X			x	x
PSY				x	x	x	x

Clinical outcomes analyzed depend on the type of intervention

4.1.2. Statistic Methods

To have the wider vision of the results two statistics methods were used: the logistic regression and the quantile regression. The two types of regression were adjusted by the difference before on the variable of interest and by the time between the first and the second evaluation.

The dependent variable of the logistic regression was the binary variable built with the cut-offs of the BelRAI scales. The cut-offs were defined as the arbitrary thresholds above which the individuals have importance difficulties with the components evaluated by the scale. The logistic regression showed the difference of the proportion around the cut-off between the intervention and the control group. Since the clients were grouped depending on their dependency profiles, the logistic regression was not significant in the majority of the cases. For example, in the group with functional limitations, the majority of the clients were well above the IADL and ADL cut-offs at the inclusion. An improvement of

their functional limitations was possible after the intervention but the improvement should be huge to drop below the cut-off. The results of the logistic regression provided for each independent variable an odd ratio and a confidence interval. The confidence interval was computed by bootstrapping. The results tables present the odds ratio adjusted and their confidence intervals for the binary independent variable allowing to identify the intervention group and the control group. The following interpretation of the odds ratio and their confidence interval can be done:

- If the confidence interval of the odds ratio included 1, the risk was considered to be the same for the intervention and the control group.
- If the confidence interval of the odds ratio was significantly greater than 1, the intervention was considered to be a risk factor.
- If the confidence interval of the odds ratio was significantly less than 1, the intervention was considered to be a protective factor.

In addition, to complete the information of the logistic regression, the statistical description of the proportion of use was presented in the tables for the intervention and the control groups without adjustment.

The quantile regression was added to have a global vision of the BelRAI scales distributions. This regression presented by graphs, represents the quantiles in function of the difference between intervention and control group. The shaded area represents the confidence interval which was computed by bootstrapping. When this shaded area does not include the value zero, the difference between the intervention and the control group is significant for the respective quantile. The results of these two analysis were presented in the overview tables by: (1) an up-down arrow indicating an increase or a decrease of the clinical outcome, (2) the percentage of the intervention group who is concerned by the increase or decrease, (3) the position of the increase or decrease in the distribution and (4) the maximum amplitude of the increase or decrease. (Example: ↓20%, ADL<3, 2/6 = significant decrease, of maximum 2 points on 6, for 20% of the clients with an ADL score below 3). In addition, to complete the information of the quantile regression, the statistical description of median and interquartile space, of the intervention group at the second evaluation, was added on the quantile regression graphs.

4.2. Consequences on utilization of reimbursed health care services

For all types of intervention, 3 groups of healthcare consumptions were evaluated:

- The appropriate use of services including the (hygiene) nursing care, the day care center and the short-term institutionalization.
- The inappropriate use of services including the emergency visits, the GP out-of-hours visits and the hospitalizations
- The definitive institutionalization (and the mortality)

4.2.1. Statistical methods used

The consequences on the health care consumption were assessed over the period of six months after the inclusion with the disability profiles control group and over the periods of six and 12 months after the inclusion with the historic health care consumption profiles control group.

The appropriate and inappropriate use of services was analyzed with two variables: (1) the proportion of utilization and (2) the frequency of utilization among the users. The logistic regression was used to evaluate the difference of the proportion of utilization between the intervention and the control group. The quantile regression combined information of the difference of proportion and the difference of frequency among the users between intervention and control groups. These two types of regression were adjusted for the difference pre-intervention on the variable of interest and for the time spent at home. The adjustment with the difference before was particularly necessary with the disability profile control group because individuals with similar disability profile can have different historical healthcare consumptions, especially since the control group was recruited by nursing home care services. In addition, statistical descriptions of intervention and control groups without adjustment were added to facilitate the comprehension of the results. The proportion of use was added in the logistic regression tables and the median and its interquartile space of the intervention group at the second evaluation was added on the regression quantile graphs.

The differences in the risk for definitive institutionalization and in the risk of death were computed by the incidence rate ratio between the intervention and the control group. The incidence rate was computed for the intervention and the control group. « *The incidence rate in a group is defined as the number of events in that group divided by the total person-time accumulated during the study in that group* » (Rosner, 2015). The goal was to adjust the risk population to the time spent by each individual in this population. The incidence rate ratio was calculated by the incidence rate of the intervention group divided by the incidence rate of the control group. The incidence rate ratio was presented with its confidence limits to

Interpretation of the IRR is the same as for the relative risk (ref report first call) except that the denominator is person-month and not at-risk population.

- If the confidence interval of the IRR included 1, the risk was considered to be the same for the intervention and the control group.
- If the confidence interval of the IRR was significantly greater than 1, the intervention was considered to be a risk factor.
- If the confidence interval of the IRR was significantly less than 1, the intervention was considered to be a protective factor.

4.2.2. Additional descriptive analysis.

To better understand the consequences of the interventions on the use of nursing care and the (short-term and definitive) institutionalization, additional descriptive analyses were made. Their goal was to describe the disability profile of the intervention group depend on their health care consumption profile. The additional analysis of nursing care use were carried out on the intervention and the control group for the disability profiles and on the intervention group only for the health care consumption profiles. Additional analysis on the institutionalization were made only on the intervention group for

the health care consumption profiles. The analysis with the health care consumption profile can exclusively be carried out the intervention group, since the BelRAI database was not available for this control group.

The unmet needs and the non-justified needs were assessed for the use of nursing care. The unmet needs were defined as the proportion of persons with hygiene tasks difficulties or with in addition incontinence problems who don't benefit of nursing care. The non-justified needs in opposition were defined as the proportion of persons with no/low hygiene tasks difficulties and no incontinence problem who benefit of nursing care.

For the institutionalization, the justified or non-justified institutionalizations were evaluated depending on the disability profile and the informal caregivers burden. The short-term institutionalization can be justified for clients with cognitive impairment as a necessary respite for the informal caregivers and for clients with functional limitations as a revalidation period after a hospitalization. The definitive institutionalization is justified for clients with a high dependency profile and especially with cognitive and behavioral problems. Clients with only functional limitations should be supported at home. So, institutionalization of clients with low limitations, IADL limitations and initial cognitive impairments or functional limitations are considered as non-justified.

4.3. Cost evaluation of the change of services utilization

4.3.1. The societal perspective

The evaluation of costs was planned to be performed from the societal perspective (Drummond et al., 2005), i.e. the perspective of the main funding stakeholder was considered:

- Public payers:
 - The NIHDI for the reimbursed health care services linked to disability or likely to change after implementing interventions
 - federated entities : the cost of nursing home (including day care cost)
- Clients: co-payments and supplements for reimbursed health care services, the cost of social care services (meal-on-wheels and household aid), accommodation cost of daycare and nursing homes.
- Informal carers : the cost of informal care

N.B. For social care services, the cost was attributed to clients. However, for low income clients, the cost of these services is not entirely paid since there may be a financial contribution from local funding stakeholders (municipalities, federated entities) based on the financial capacity of clients. Data about the shared financial contribution could not be collected: these questions would have been too complex to ask to the frail older persons.

4.3.2. The cost of reimbursed health care services

Services linked to disability or likely to change after implementation of interventions were assessed. Three types of health care services were analysed in the study services directly linked to the support of frail older persons living at home and residential care, nursing home stays and hospitalizations.

Chapter 1 Methods

4 Evaluation of the consequences of the interventions on the clinical outcomes and the healthcare consumptions.

Short-term stays in nursing home are defined as less than 90 consecutive days and definitive stays in nursing home are defined as more than 90 consecutive days.

For home-based health care support, only certain types of provisions were evaluated: physiotherapy, nursing care, speech therapy, daycare center provisions (including transportation costs) and technical equipments:

- article 27 §1, truss supplier (except mammectomy equipment) for technical devices (e.g. incontinence equipment)
- article 28 §8, truss supplier with specific certifications for mobility equipment
- 30 §1, optician
- 31, hearing aids of the chapter VI of the health care classification) .Speech therapy provision was included in the cost estimation as it can be considered as long-term care. Physiotherapy was also included because increases in this type of provision may indicate benefit from the intervention.
- Incontinence lump sum
- Finally, utilization of daycare centers was also included as part of the home-based support.

Medical costs include cost of GP, geriatricians, neurologists, neuropsychiatrists, psychiatrists.

The main issue was related to the calculation of the cost for a given period of time. Among the clients, some died before the end of the period of follow-up. Therefore, the period of follow-up is not the same for all beneficiaries. The duration of follow-up was corrected by the date of death.

The costs of nursing home stays and hospitalizations were calculated in three steps according to the total cumulated days for the period considered:

- the average cost per day for each stay was calculated
- the total number of days spent in a nursing home for the period under consideration per client was estimated. The periods considered are:
 - the number of days for the six (or twelve) months preceding the entry in projects
 - the number of days alive in the six month after the entry in projects
- the total cost per client per stay for the two periods were calculated as follows: the number of days in nursing home for each stay during the period multiplied by the average cost per day of each stay. The total cost in nursing home is the sum of the total cost for each stay during the periods considered.

The cost of hospitalizations for the NIHDI was calculated as follow: the general costs (Financial Budget or Financial Means) for non-medical activities of the admission and stays¹ and pharmaceutical, physician and technical services costs.

The costs for the NIHDI, the clients (co-payments and supplements) of health care services were calculated based on the CIN-AIM data. For the clients, a lump sum of 100 euro per month has been added according to the BelRAI data about incontinence: the persons with incontinence episode more frequently than one per 3 days. The cost for the federated entities for nursing home and daycare was calculated by using the CIM-AIM data. For the clients, an average cost was used and added to value

¹ Partly recorded in the IMA-AIM database but corrected by the agency.

the price paid for accommodation based on the data available in 2014² (45.97 Euro daily price on average in Belgium).

The estimation of the difference of the total net cost for the NIHDI and all funding stakeholders has been performed by using a multivariate generalized linear model with a Gamma family distribution and a log link (Mihaylova et al., 2011). The difference estimated between the intervention and the control group has been adjusted according to the proxy of the socio economic status (based on the median of the fiscal income of the municipality of the clients), the death occurring within the period considered (6 or 12 months after intervention) and the cost observed before intervention.

4.3.3. Social care services and family care

The time spent by family carers has been valued by using the replacement cost method (Paraponaris et al., 2012, van den Berg et al., 2004, van den Berg et al., 2006, Wubker et al., 2014). The hourly rate used is the total cost of household 22.04 Euro in 2014 (Maarten et al., 2013). The valuation is performed according to cost unit of the close substitute professional (formal care is supposed to be a good substitute to family care). This estimation can be interpreted as the cost that would be spent in the absence of the informal caregivers to support disabled elderly at home. The time spent on caring is limited to 8 hours per day since there is no professional equivalent who lives with the care recipient: i.e. the level of presence of professionals cannot permanently exceed such threshold at home. The tasks considered in the time estimation were different according to the living arrangement of the main informal carer (Cès et al., 2017a):

- For non cohabitant carers, help with ADL (personal hygiene care, dressing, eating, mobility inside the house, with IADL (meal preparation; shopping, finances, housekeeping, laundry, transportation, health treatment at home, organization of formal help) and supervision (of formal care, the care recipient and monitoring of the care recipient).
- For cohabitant carers, help with ADL (as mentioned above) and with IADL (same as mentioned except meal preparation, shopping, finance, housekeeping) and supervision (same as mentioned above).

For social care services, the total number of hours for the last past week has been asked for the household aid service. For meals-on-wheels, the frequency per month was collected. The cost unit of meals-on-wheels has been estimated through a phone survey of a sample of organizations providing this service in Wallonia. The real cost is rarely known as there is no separated accountancy for such services within organizations. The unit of cost is an estimation of the real cost (6 Euro).

The intensity of use of family care and social care services has been adjusted according to the number of days spent at home for the six-month periods considered. Indeed, the intensity is supposed to be null during the number of days spent in residential care (hospitals or temporary stays in nursing home).

4.3.4. Uncertainty of the difference of means between control and intervention groups

To test the significance of cost differences between the control and intervention arms, different statistical approaches are possible. However, some of the intervention groups were small because of

² Federal data available of the daily price paid by resident of nursing home on the FOD- SPF website. Since the 6th state reform, these data are no longer available for the whole country.

the stratifications using the profiles of beneficiaries and the different project groups. Also, most of the distributions of cost were highly skewed and a non-parametric method was thus preferred using a bootstrap simulation to build the confidence interval of the difference (Mihaylova et al., 2011, Nixon et al., 2010). There was no assumption on the normality of data or on the variances, but two assumptions are necessary when using the bootstrapping method:

- the distribution obtained in the original sample is close to the distribution of the population
- the multiplication of the bootstrap replications enables a true distribution of the estimator to be obtained.

The selection of individuals to constitute the sample replications was performed randomly with replacement by the same size as the original sample: i.e., some individuals could either be excluded from a replication or be selected several times. One hundred replications of the sample were performed from which 1000 empirical means were calculated (command `boot` in R). The percentile quantiles are used to determine the confidence interval for a threshold of 5%. Comparison of the mean daily costs for the period before the intervention enabled one to check whether the difference after the intervention was consistent. Indeed, if differences existed before an intervention, a simple comparison of the post-intervention mean between the intervention and the control group would not be correct because the result may just describe the pre-intervention difference. This issue is possible since the control group was elaborated paired-wise according to each profile of beneficiaries and not the level of health care costs. Therefore, a pre-intervention comparison was performed in order to ensure that the difference estimated after a certain period of follow-up could be interpreted as being a consequence of the implementation of the projects and not as a continuum of an already existing situation.

Nevertheless, if there was a significant pre-intervention difference, it may still be possible to interpret post-intervention differences when there was no replication of the difference observed before the intervention. For example, short stays in nursing homes may be used more in the control group than in the intervention group before P3 inclusion. If this difference is no longer observed for the post-intervention period or if the difference is in the opposite direction after the intervention, it is possible to deduce how the intervention has impacted health care services utilization. However, the quantification of the effect remains impossible in such a configuration.

5. Evaluation of the cost of interventions

All resources used by projects have been included: i.e. including the resources not directly funded by the NIHDI.

5.1. Estimation of the intervention cost

The top down gross costing method was used to assess the cost of the interventions per profile of beneficiary (Tan et al., 2009). The first level of estimation was the average cost per project regardless of the profile of the beneficiaries. This cost per project was weighted according to the relative number of beneficiaries for each profile in the intervention group. The major drawback of this methodology is that it was not possible to perform statistical analyses according to the different profiles of beneficiaries. Indeed, no individual data were collected on the resources used by the beneficiaries. At last, the cost of

intervention was also weighted according to the number of days alive per client after six and twelve months.

Data on the costs of each project were collected through different surveys implemented by the NIHDI to control the use of the allocated funding:

- For the projects that were not funded after 2014, the cost data were collected for different periods of time depending on the date of the end of the contract with the NIHDI (June 2011 to May 2012 or 2013 or 2014).
- For some projects, the data from the period prior to the last one were considered because the last period was too short to represent routine functioning of the project.
- For the projects with an extension of funding after 2014, the cost data were collected for the period starting from June 2014 until May 2015.
- For the projects of second call, the cost data were collected for the period June 2015 until May 2016.

Different types of resources are considered in the cost estimation:

- Resources funded by the NIHDI: for human resources, the estimation was based on the total number of professionals funded by the NIHDI who had been working in the projects during the twelve-month period considered. These individuals could have been partially or fully employed by another organization and could also have been excluded for a short period of time because of temporary absence for whichever reason (maternity, sickness leave, holiday...). The total FTE currently working in projects was thus determined per month and aggregated for one year.
- Resources funded by other organizations used in the projects:
 - The cost of administrative human resources
 - The other transportation costs which are not funded by the NIHDI
 - The office cost: the office cost is attributed according to the total number of FTE used in each project. This resource has been asked in the yearly surveys of NIHDI. However, some corrections had to be done in order to replace missing answers.

The mean cost of offices per FTE was calculated for all projects and used to replace for missing values.

The total cost declared in the periodic surveys may not be the cost funded after financial controls. Three types of variation were possible:

- Significant deviations from the objectives planned in the convention with the NIHDI (more than 25%) were sanctioned, e.g., a caseload of clients that was too low, an FTE/caseload ratio that was too high, or units of activities was not reached... When the situation persisted, despite several warnings, the projects were asked to reimburse the overpayment according to the theoretical cost per client as planned in the convention.
- Another reason for reimbursement was unjustified expenses. Projects had to provide invoices and some of them were not directly related to the P3 intervention itself (e.g. fire protection investment). A reimbursement was thus requested for these expenses.
- The last possibility of deviation from the planned budget was transfer between budget items. A shift was possible if the total amount of the item did not exceed 5% of the amount planned.

The cost calculated took into account those adjustments.

Considering the great discrepancies of costs between the different projects gathered within intervention types and the difficulties to get the right data about the intensity of the services provided in the setting of Protocol 3 (duration, end of intervention, number of clients...), the level of cost estimated cannot constitute the right level of cost to be funded. However, this is useful information to delineate the interval of cost to fund. This issue has to be discussed based on the recommendations from the qualitative research part. The type of funding chosen and the data collected for the financial control would have to be carefully chosen in order to avoid having to make estimations about the intensity of services provided.

5.2. Estimation of the total number of beneficiaries followed for one year

5.2.1. The main issue

Assessing the cost of the intervention over a period of time requires to know the total number of beneficiaries included during the year under consideration and the duration of intervention. These important parameters to calculate the average cost of the project were difficult to estimate.

The total number of client days over a period of time was difficult to assess for different reasons:

- The number of clients who were currently in the flow is difficult to define. Indeed, for certain projects, follow-up may not require close contact for all periods (e.g., case management projects may vary the intensity of contacts according to the individual situation). Some clients may still be in the projects but receive less intense care. The definition of less intense care is problematic because it may depend on the type of intervention (e.g., case management, psychological support, occupational therapy.). There was no standardized explicit definition of the end of follow-up. Some projects still counted the client in their caseload even when there was no regular contact (i.e., for more than two months).
- The caseload of beneficiaries declared in the NIHDI survey may not reflect the correct number of clients followed for a given period. Considering the obligation of the projects to reach the caseload mentioned in the contract with the NIHDI, some projects may still have counted some beneficiaries even when there was little contact with them. The qualitative study of the implementation of the projects confirmed that some organizations encountered difficulties reaching their caseload. The risk is, therefore, that the total number of beneficiaries was overestimated.

5.2.2. Checks performed

Different types of control were performed to clean these data according to the type of inconsistency (the total number of beneficiaries and/or the duration of follow-up):

- The caseload was recalculated according to the number of BelRAI evaluations of the year under consideration.
- For occupational therapy projects, clients included since 2010 were dropped.

- The total number of clients was also routinely recorded in another database (P3.BelRAI.org), including all the clients who received an intervention with a record of the entry and exit dates.

The average costs per client, per project, per intervention type, are shown in each chapter.

5.2.3. Uncertainty

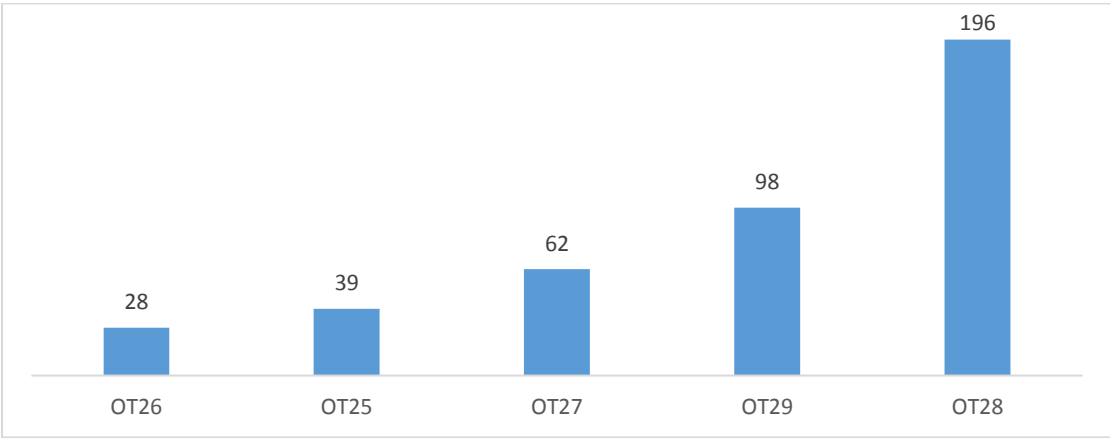
It is not possible to perform probabilistic simulations because there are no individual data on intervention costs. However, the average cost of the project was weighted by the proportion of beneficiaries within specific groups of disability.

Chapter 2. Results of occupational therapy interventions

1. Cost of interventions

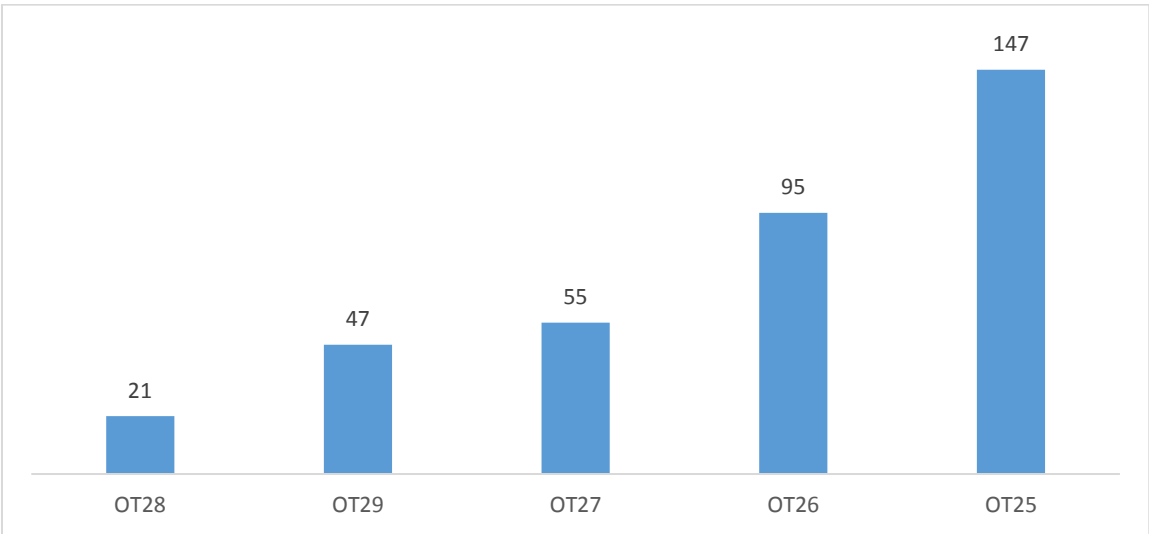
Among, OT therapy projects, the total number of client per FTE varies between 28 and 196 clients.

Figure 5 Number of clients per FTE (health care professionals) for OT



For occupational therapy projects, the cost of the other resources used not funded by the NIHDI represent in average 8.4% of the NIHDI budget. The average cost per client varies between 21 and 147 Euro per client, per month.

Figure 6 Average cost per month per client for the NIHDI for OT



2. Results of the effectiveness and the costs

2.1. Description of the target population

2.1.1. Disability profiles

Description of disability profiles

The beneficiaries of occupational therapy were clustered in fourth disability profiles:

- **Clients with low limitations:** low functional and cognitive impairments, but 26% of this group had a score on the DRS scales above the cut-off. These clients suffered from significant depressive symptoms.
- **Clients with IADL difficulties and initial cognitive impairments:** 94% of this group had a score of IADL scale above the IADL cut-off which means they have significant difficulties with IADL tasks. Only 12% of this group had a score on the CPS scale above the CPS cut-off, which means significant cognitive impairment. However, the majority of this group presented initial cognitive impairments with a CPS score of 1 or 2 on a 6-point scale.
- **Clients with functional limitations:** 95% and 99% of this group respectively had a score of IADL and ADL scales above the cut-off of these scales. This means that these clients had significant functional limitations. The cognitive impairment was limited in this group with 75% of the clients with a score of 0 on the CPS scales and none with a CPS score above the cut-off.
- **Clients with functional and cognitive impairments (with or without behavioral problems):** the clients in this group combined functional (with respectively 99% and 87% of the clients with a score on the IADL and ADL scales above the cut-off of these scales) , cognitive impairments (92% of the clients with a score on the CPS scale above the cut-off of this scale) , behavioral problems (32% of the clients had at least one behavioral problem), and depressive symptoms (37% of clients had a DRS score above the cut-off).

Description of socio-demographic variables

The socio-demographic characteristics of the intervention group and the control group are shown in table 1.2. The main differences between the control group and intervention group across clusters are caused by the regions where older people live. By making an extrapolation for the median income per region, the table shows significant differences between the income of the populations in the intervention group and the population in the control group. In all clusters the control group shows a higher percentage of clients in the high median income groups, which means that the control group has a larger proportion of people in the higher income groups than the intervention group. This fact is probably due to the selection bias of the control group as it has been selected from clients already receiving nursing care at home. No difference was observed on the presence of informal caregivers since a stratification on this variable was made before the matching.

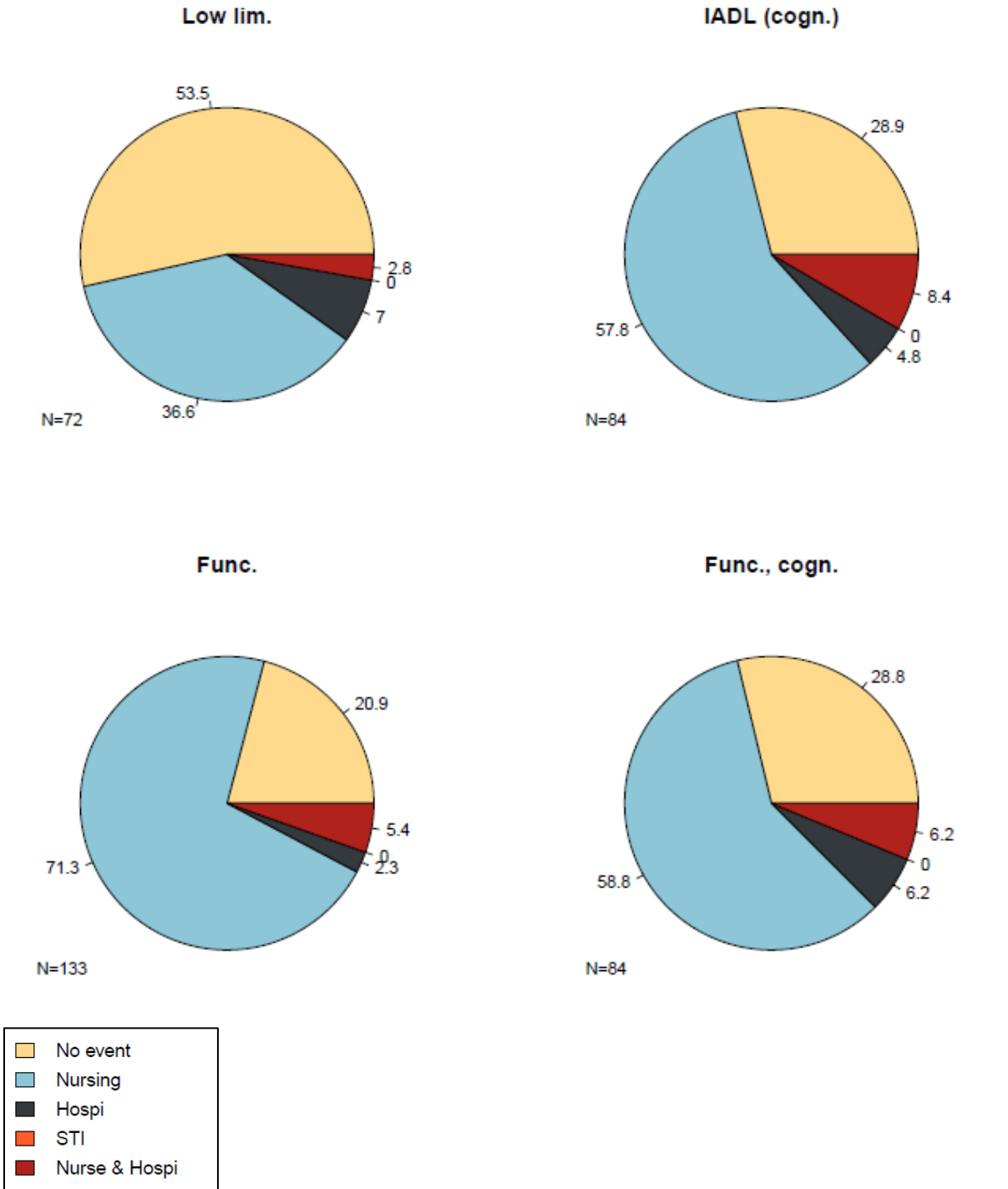
Table 2 Sociodemographic characteristics per disability profile for OT

	low limit.		IADL, (cogn.)		func.		func., cogn.	
	T	C	T	C	T	C	T	C
Age								
Median[IQR]	78[73-83]	81[74-87]	80[74-82]	81[75-86]	80[74-85]	82[76-87]	80[75-85]	82[78-87]
Gender								
% Men	26.39	26.39	32.14	40.48	30.08	27.07	38.1	28.57
% Women	73.61	73.61	67.86	59.52	69.92	72.93	61.9	71.43
ICG								
% No ICG	41.67	41.67	23.81	23.81	17.29	17.29	0	0
% No cohabitant	27.78	27.78	33.33	33.33	27.07	27.07	15.48	15.48
% Cohabitant	30.56	30.56	42.86	42.86	55.64	55.64	84.52	84.52
Region								
Bruxelles	0	0	0	0	0	0	0	0
Flandre	55.56	36.11	55.95	47.62	47.37	84.96	33.33	73.81
Wallonie	44.44	63.89	44.05	52.38	52.63	15.04	66.67	26.19
Median income								
Low	30.56	33.33	29.76	40.48	27.82	6.02	30.95	14.29
Medium	69.44	44.44	67.86	48.81	66.92	51.88	60.71	48.81
High	0	22.22	2.38	10.71	5.26	42.11	8.33	36.9
N								
Unique value	72	38	84	48	133	80	84	51

The figure hereafter presents the key previous healthcare utilization pattern of population grouped by disability profiles. The following characteristics may be highlighted:

- The proportion of use of nursing care was high whichever the disability profile. For example: 33% of clients with low limitations used nursing care before the inclusion. This can be explained by the umbrella organization of the occupational therapy. In fact, for both projects with the high number of clients per FTE (69% of beneficiaries of occupational therapy interventions were enrolled by the OT 29 and OT 28 projects), the umbrella organisation was an organisation providing nursing care at home. Through their umbrella organization, they had an easy access to clients for referral, and the nurses in their own organisation could refer clients in need of occupational therapy, to the occupational therapist.
- The proportion of hospitalization was higher for the disability profiles with a cognitive component.

Figure 7 Description of the characteristics of historic health care consumption profile per disability profile for OT



2.1.2. Health care consumption profiles

Description of historic health care consumption profiles

The beneficiaries of occupational therapy interventions were grouped in four historic health care consumption profiles:

- Clients without specific health care consumption before the inclusion in the intervention
- Clients with (hygiene) nursing care (for at least 3 months in the year before the inclusion, at least 2 times per week)
- Clients with a recent hospitalization (hospitalization for more than one day in the two months before inclusion)
- Clients with a recent hospitalization and (hygiene) nursing care

Description of socio-demographic characteristics

The main differences between control group and intervention group across clusters are for gender, except for the cluster nursing. The table shows significant differences between the income of the populations in the intervention group and the population in the control group for the clusters ‘no event’ and ‘nursing’. In these clusters, the control groups show a higher percentage of clients living in communes of high median fiscal income per household than in the intervention group. This is the opposite for the cluster ‘hospitalization’ and there is no difference for the cluster ‘nursing and hospitalization’.

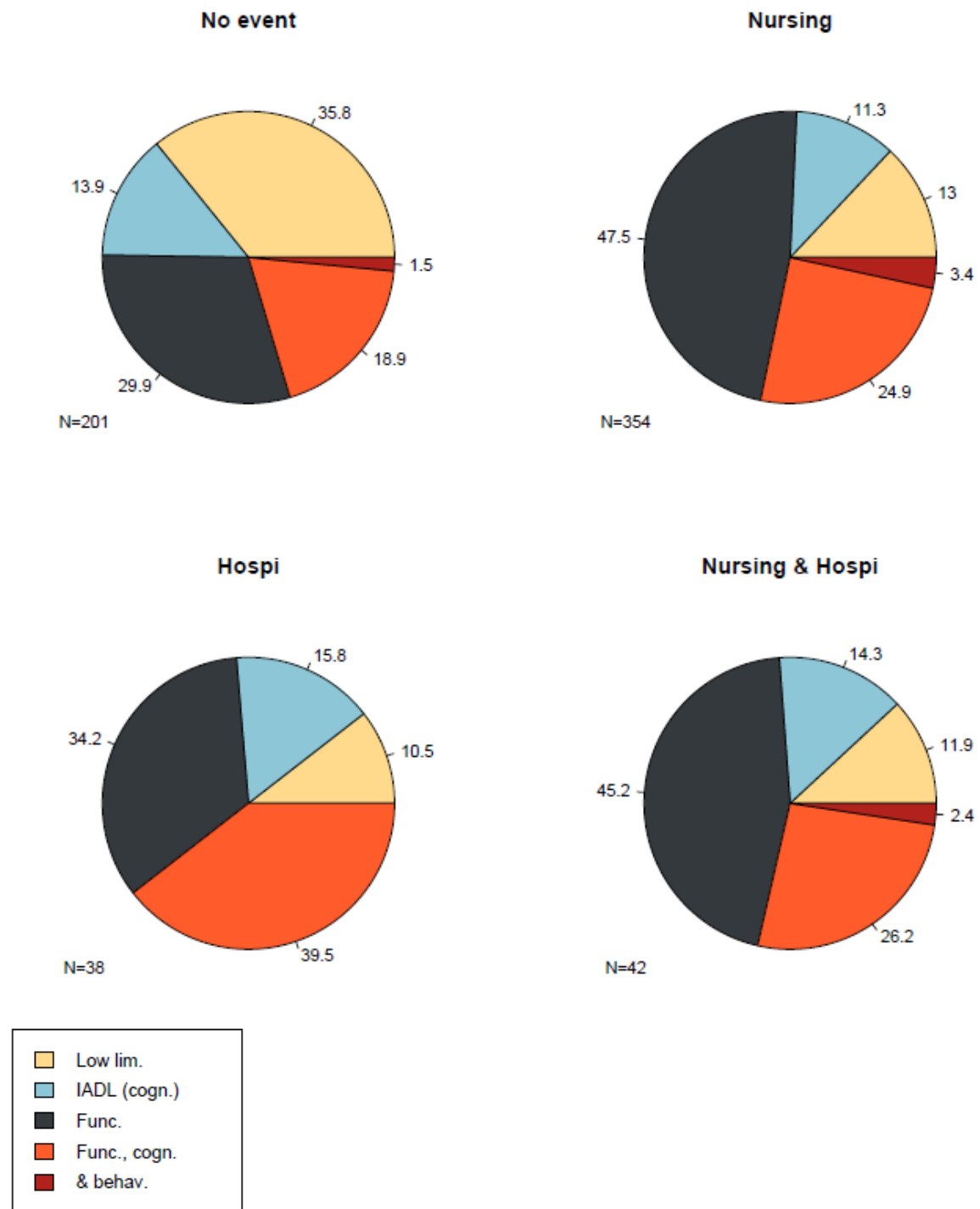
Table 3 Sociodemographic characteristics per health care consumption profile for OT

	No event		Nursing		Hospi		Nursing, hospi	
	T	C	T	C	T	C	T	C
Age								
Median[IQR]	80[74-84]	79[73-83]	80[75-85]	81[76-85]	81[77-85]	82[77-86]	84[80-88]	84[80-88]
Gender								
% Men	31.34	44.78	34.18	33.33	39.47	28.95	23.81	33.33
% Women	68.66	55.22	65.82	66.67	60.53	71.05	76.19	66.67
ICG								
% No ICG	23.38	-	22.6	-	18.42	-	16.67	-
% No cohabitant	26.87	-	27.68	-	28.95	-	40.48	-
% Cohabitant	49.75	-	49.72	-	52.63	-	42.86	-
Region								
Bruxelles	0	9.45	0	4.8	0	10.53	0	9.52
Flandre	40.8	60.2	35.31	63.28	18.42	42.11	28.57	57.14
Wallonie	59.2	30.35	64.69	31.92	81.58	47.37	71.43	33.33
Median income								
Low	38.31	28.36	34.18	24.86	42.11	34.21	42.86	38.1
Medium	54.23	50.25	57.34	47.74	42.11	55.26	47.62	52.38
High	7.46	21.39	8.47	27.4	15.79	10.53	9.52	9.52
N								
Unique value	201	191	354	287	38	37	42	34

The figure hereafter presents the key previous disability profile of population grouped by historic health care consumption profiles. Following characteristics may be highlighted:

- A large proportion of unmet need in nursing care can be observed in the group “no event” and hospitalization. Indeed, half of the group “no event” and two third of the group “hospitalization” had significant functional limitations.
- The nursing care was for the majority provided to clients with functional limitations or combining functional and cognitive impairments.

Figure 8 Description of sociodemographic characteristics for each health care consumption profile for OT



2.2. Results for the disability groups

2.2.1. Low limitations

- a) **No significant differences for functional limitations or falls.** For this cluster no significant change was found for ADL or IADL between the inclusion and second evaluation in the first six months of follow-up. This could be expected since the proportion of functional limitations in this cluster is very low. In addition, no difference was found for the risk of falls.
- b) **A slight increase in the burden of co-habitant informal caregivers.** The intervention is associated with an increase of 5 points in a scale of 48 for 20% of co-habitants, but the burden remains at a low level at the second evaluation, below the cut-off of the Zarit scale.
- c) **No significant difference was found for the perceived quality of life.**
- d) **The proportion of use of nursing care is higher in the intervention group.** The proportion of people without problems with hygiene tasks or incontinence receiving nursing care has increased in the intervention group (from 4% of the total group to 14%). In the control group this increase was from 11% to 21%. The unmet needs at inclusion were 55% for people with only difficulties in hygiene tasks and 38% for people with additional continence problems. The unmet needs for the first group decreased to 41% but they increased for the second group to 62%. This was a negative effect of the intervention since the unmet needs only decreased from 27% to 24% of the whole intervention group. In the control group these unmet needs were totally covered at the second evaluation.
- e) **No difference in the proportion or frequency of emergency visits, hospitalizations or GP out-of-hours visits.**
- f) **No significant difference on institutionalization or death.**
- g) **The costs for the NIHDI:**
 - The intervention cost estimated was 65.8 euro per month per client.
 - The average cost of nursing care per month per client has increased in the intervention group (from 107 euro to 182 euro). However, the average cost remained higher in the control group after six months with an average of 634 euro. This difference in the level of costs is significant for 50% of the intervention group.
 - The cost paid for GP and specialist consultations was lower in the intervention group than in the control group for almost 75% of the clients. This difference is significant but limited to a maximum of 60 euro per month per client.
 - The cost of hospitalization was lower for almost 20% of the clients in the intervention group. The average days in hospital was lower for 15% of the intervention group
 - Costs incurred at home were lower in the intervention group, on average 212 euro less per month per client. When including the costs of hospitalization and intervention, the costs for the NIHDI were in average 355 euro per month lower. The costs incurred at home were significantly lower in the intervention group for almost 80% of the clients
- h) **The costs for the regions:**
 - No change was observed on the cost of daycare between the two groups.
 - The cost of temporary institutionalizations decreased in the intervention group while it increased in the control group. The cost in the period of 6 months was 12 euro in the intervention group and 6 euro in the control group. No significant difference was observed.

- The cost of definitive institutionalizations was not significantly different. This was on average 20 euro per client per month.
- i) The costs for the clients and informal carers:**
 - For reimbursed health care services and nursing home, the total net cost was not significantly different between the intervention and the control group.
 - No difference was observed between the two groups for daycare.
 - No difference was observed between the two groups for temporary institutionalizations.
 - No difference was observed between the two groups for definitive institutionalizations.
 - The informal care cost was not different between the two groups.
 - No significant difference for the cost of household aid or meals-on-wheels.
- j) For all stakeholders,** the net cost was on average 386 euro lower in the intervention group. These costs are lower for almost 80% of the clients.
- k) There was no difference in the total number of days** spent at home between treated and control group.

2.2.2. IADL impairment (with or without some cognitive problems)

- a) A very limited decrease in IADL.** For this cluster a very small decrease in IADL impairment was found for clients with IADL score below 28. No significance differences were found for the incidence of falls.
- b) Significant changes in the burden of informal caregivers.** The intervention is associated with a slight increase of 4 points in a scale of 48 for almost 5% of non-cohabitants with burden at the cut-off value and an improvement in burden of 5 points for non-cohabitants with high burden (above 20). For 20% of the clients in the intervention group there was a slight but significant improvement in perceived quality of life (2 points in a scale of 48).
- c) No significant change in the proportion of use of nursing care.** In the intervention group, the unmet needs at inclusion were 43% for people with only difficulties in hygiene tasks and 33% for people with additional continence problems. These unmet needs decreased respectively to 31% and 8%. In total, the unmet needs only decreased from 28% to 18% of the whole intervention group. In the control group, these unmet needs were almost totally covered at the second evaluation 7.6% to 1.3%. The proportion of people without problems with hygiene tasks or incontinence receiving nursing care has not changed in the intervention group (3.8% at inclusion and at the second evaluation). In the control group this increase was from 6.3% to 8.9%.
- d) No difference in the proportion or frequency of emergency visits, hospitalizations or GP out-of-hours visits.**
- e) No significant difference on institutionalization or death**
- f) The costs for the NIHDI:**
 - The estimated intervention cost was 66 euro per months per client.
 - The average cost of nursing care increased in the intervention group (from 209 to 272 euro). However, for 70% of the clients, the average cost per month was significantly higher in the control group after six months (average nursing cost of 1076 for the control group in 6 months).

- The cost paid for GP and specialist consultations was lower in the intervention group than in the control group for 80% of clients in this cluster.
- There was no difference in the cost of hospitalizations in the period of 6 months but the average cost started higher in the intervention group (1361 euro) and decreased to 759 euro per month per client. In the control group, the costs were more stable (from 551 to 473 euro per month per client).
- The costs incurred at home were significantly lower in the intervention group (average of 359 euro per month per client less than the control group). These costs were analyzed together with the cluster 'functional'.
- When including the costs of hospitalization and intervention, the costs for the NIHD were on average 458 euro per month lower). The total net cost was lower for this group for about % of clients.

g) For the regions

- The day care costs are lower in the intervention group (6 euro per month per client). In the control group they are 59 euro.
- The cost of temporary institutionalizations remained stable in the intervention group and decreased in the control group. The cost was 41 euro per client per month in the intervention group. No significant difference was observed in the two groups.
- The cost of definitive institutionalizations was not significantly different in the period of 6 months. This was on average 47 euro per client per month.

h) For the clients and informal carers

- The day care costs are lower in the intervention group (0 euro in the intervention group and 31 euro in the control group).
- For reimbursed health care services, the total net cost was not significantly different between the intervention and the control group.
- The costs of temporary stay in nursing homes were significantly higher in the intervention group but they started higher at the beginning of the intervention. No difference was observed between the two groups before and after intervention.
- There was no difference on the cost of definitive institutionalizations.
- The informal care cost increased in the intervention group and decreased in the control group. This cost was significantly higher in the intervention group in the 6 months period 2184 Euro versus 829 Euro in average in the control group).
- No significant difference for the cost of household aid or meals-on-wheels.

i) For all stakeholders, the net cost was on average 513 euro lower in the intervention group. These costs are lower for almost 60% of the clients.

j) There was no difference in the total number of days spent at home between treated and control group.

2.2.3. Functional (IADL & ADL impairment)

a) Good results for functional performance. For this cluster a small IADL decrease of 3 points in 48 was found for clients with IADL score below 32. These are about 15% of the client population in this cluster. The intervention is also associated with an improvement on ADL functioning for people with low and moderate ADL impairment (below the cut-off of 3) and for

people with higher ADL impairment (score above 4). This means that occupational therapy effectively improves the ADL-functioning of clients in the intervention group compared to the control group. Concerning the incidence of falls in this cluster compared to the control group, the results show a significant decrease of the proportion of clients who suffer falls.

- b) Significant changes in the burden of informal caregivers.** The intervention is associated with a decrease of 4 points in a scale of 48 for almost 20% of non-cohabitants with high burden above 18 at the second evaluation. For 40% of co-habitants, the burden increases of 2 points for people with burden between 7 and 13. In the intervention group there was a slight but significant improvement in perceived quality of life for 3% of the clients.
- c) No significant change in the proportion of use of nursing care and unmet needs remain in the intervention group.** In the intervention group, the unmet needs at inclusion were 32% for people with only difficulties in hygiene tasks and 16% for people with additional continence problems. These unmet needs decreased respectively to 27% and 12%. In total, the unmet needs only decreased from 20% to 16% of the whole intervention group. In the control group, these unmet needs were almost totally covered at the second evaluation 5% to 0.8% of the whole control group.
- d) A lower frequency of emergency visits.** There is a slight decrease in the frequency of visits to the emergency department for almost 20% of the clients who used these services.
- e) A lower frequency of hospitalizations.** The intervention group shows a slight decrease in the frequency of hospitalizations for 10% of the older people who were hospitalized before.
- f) No change on the GP out-of-hours visits.**
- g) A higher risk of death.** This can be an indication that the intervention group is frailer than the control group.
- h) No significant difference on institutionalization.**
- i) The costs for the NIHDI:**
- The estimated intervention cost was 68.4 euro per months per client.
 - The average cost of nursing care increased in the intervention group from 346 to 541 euro per month per client but these costs remained significantly much higher in the control group for 90% of the clients. The costs in the control group varied from 713 to 1182 euro per client per month.
 - The cost paid for GP and specialist consultations was lower in the intervention group than in the control group for all clients in this cluster. This difference ranged from 10 to 50 euro.
 - There was no difference in the cost of hospitalization in the period of 6 months but the average cost started higher in the intervention group (1696 euro) and decreased to 1298 euro per month per client. In the control group the costs increased (from 299 to 674 euro per month per client).
 - The costs incurred at home were significantly lower in the intervention group (average of 359 euro per month per client less than the control group).
 - When we included the costs of hospitalization and intervention, the costs in the intervention group were on average 458 euro lower than in the control group. This is the case for 80% of the clients.
- j) The costs for the regions**
- The cost of temporary institutionalizations remained stable in the intervention group and increased in the control group. The cost was 9 euro per client per month in the intervention

group and 14 euro in the control group. No significant difference between the two groups was observed.

- The cost of definitive institutionalizations was not significantly different in the period of 6 months. The cost was on average 18 euro per client per month.

k) The costs for the clients and informal carers

- For reimbursed health care services, the total net cost was not significantly different.
- No difference for the costs of temporary stay in nursing homes.
- No difference was found for the cost of definitive institutionalizations.
- The informal care cost decreased in the intervention group and increased in the control group but the difference was not significant.
- No significant difference for the cost of household aid or meals-on-wheels. The costs of meals-on-wheels remained stable in the two groups.

l) For all stakeholders, the net cost was on average 513 euro lower in the intervention group. These costs are lower for almost 70% of the clients.

m) There was no difference for the average of days spent at home.

2.2.4. Functional and cognitive problems (ADL, CPS and also behavior group)

a) Good results for functional performance. The results show a slight decrease in IADL impairment for 10% of the clients in the intervention group, with an IADL score below 40 at the second evaluation. In addition, the intervention is associated with a larger proportion of people moving below the cut-off of the ADL scale compared to the control group. No effect was found for the incidence of falls.

b) Significant changes in the burden of informal caregivers. The intervention is associated with a decrease of 5 points in a scale of 48 for 10% of informal caregivers living with the older person. These are informal caregivers with high burden (above 18). No difference was found for non-cohabitants and no difference was found for the perceived quality of life of clients.

c) No significant change in the proportion of use of nursing care. In the intervention group, the unmet needs at inclusion were 42% for people with only difficulties in hygiene tasks and 42% for people with additional continence problems. These unmet needs decreased respectively to 21% and 23%. In total, the unmet needs only decreased from 37% to 20% of the whole intervention group. In the control group, these unmet needs were almost totally covered at the second evaluation 7% to 1.2%.

d) A lower frequency of emergency visits. The results for the intervention group show a decrease in the frequency of emergency visits for the clients who used these services.

e) No change on the GP out-of-hours visits and on the hospitalization.

f) No significant difference on institutionalization and death.

g) The costs for the NIHDI

- The estimated intervention cost was 46.3 euro per months per client.
- The average cost of nursing care has increased in the intervention group from 400 to 705 euro. Despite of this increase, the nursing costs were higher at baseline in the control group and increased in the period of 6 months as well (983 to 1916 euro).The difference of costs for 6 months was significant for 80% of the clients (lower costs in the intervention group).

- The total medical cost paid for GP and specialist consultations was lower in the intervention group than in the control group for 90% of all clients. The difference of costs was up to almost 100 euro less in the intervention group.
- The cost of hospitalizations was higher in the intervention group for 10% of the clients.
- The costs incurred at home were significantly lower in the intervention group (average of 599 euro per month per client less than the control group).
- When we include the costs of hospitalization and of the intervention, the costs difference was not significant (by including also functional limitations).

h) The costs for the regions:

- The cost of temporary institutionalizations decreased in the intervention group and increased in the control group. The cost was 19 euro per client per month in the intervention group and 25 euro in the control group in the period of 6 months. No significant difference was observed for six months.
- The cost of definitive institutionalizations was not significantly different in the period of 6 months. This was on average 57 euro per client per month and in the control group 85 euro.

i) The costs for the clients and informal carers

- For reimbursed health care services and nursing home, the total cost was significantly higher in the intervention than the control group for 15% of clients.
- No difference for the costs of temporary stay in nursing homes.
- The cost of definitive institutionalizations was not significantly different in the period of 6 months.
- The informal care cost increased in the intervention group and in the control group but the difference was not significant.
- No difference was found for the cost of household aid.
- The cost of meals-on-wheels was not different between the two groups.

j) For all stakeholders, the total net cost was not significantly different between the intervention group and the control group.

k) There was no difference for the average days spent at home.

2.3. Results for the history of consumption groups

2.3.1. No event

- a) More nursing care than in the control group.** The results show that the group receiving the intervention has a higher proportion of the use of nursing care for a follow-up period of 6 and 12 months. This seems to be a good result since 38% of the clients in this group had high ADL impairment (ADL score ≥ 3) and no nursing services. Occupational therapy seems to be targeting the people who really need nursing services. For 68% of the people for whom nursing services were started, there were problems with hygiene tasks or incontinence, which can indeed justify nursing care. Occupational therapy interventions also seem to have a stabilization effect because people continue to receive nursing services in the period of 12 months, which is in accordance with their ADL needs that did not change significantly between baseline and second evaluation.

- b) No change for emergency visits at 6 months but a decrease in proportion and frequency in the period of 12 months.** In the period of 12 months, the number of emergency visits decreased for the people in the intervention group. Clients seemed to be stabilized at home.
- c) No change for hospitalizations and GP out-of-hours for the period of 6 and 12 months.**
- d) No difference for the risk of institutionalization but a higher risk of death in the intervention group in the period of 6 and 12 months.** Because the incidence of death is higher for the intervention group in the period of 6 and 12 months, we could conclude that the intervention group seems to be frailer than the control group. The combination of occupational therapy and nursing care seems to have positive long term effects because, in spite of the fact of that the intervention group is frailer, the clients in this group show less emergency visits than the control group in the period of 12 months after baseline.
- e) The costs for the NIHDI**
- The estimated intervention cost was 58 euro in average per month per client.
 - The average cost of nursing care per month per client increased more in the intervention group than in the control group (from 5.6 to 179 euro). At baseline, they started at the same level. An increase was expected since these clients had no nursing before the start in the project and the level of nursing costs for the period of 6 months was higher in the intervention group than in the control group (for 30% of the clients). For 12 months, the average cost was 213 at 12 months) and the proportion of clients with higher costs than the control group was higher than in 6 months (40%).
 - The cost of physiotherapy was higher in the intervention group than in the control group for the period of 6 months.
 - The cost paid for GP and specialist consultation was not different between the two groups.
 - No difference for the cost of hospitalization.
 - Concerning the total net costs (at home and including the intervention and hospitalizations), the total cost was higher in the intervention group for almost 90% of the clients (average of 150 euro more per month for 6 months and 12 months). No calculations were possible for the estimation of the average difference of the total net cost.
- f) The costs for the regions**
- No significant difference for the cost of day care was observed.
 - No significant difference for the cost of temporary was observed.
 - No significant difference for the cost of definitive institutionalization was observed. This cost was 11 euro in intervention group and 32 euro in the control group in 6 months.
- g) The costs for the clients**
- For reimbursed health care services and nursing home, no difference was observed.
 - No significant difference for the cost of day care or temporary institutionalization.
 - The cost of definitive institutionalizations was not significantly different between treated and control for 6 and 12 months.
- h) For all stakeholders, the costs were slightly higher in the intervention group for the period of 6 months. These costs are higher for about 50% of clients in the 12 months period (about 100 euro higher).**
- i) For the periods of 6 and 12 months, no change was observed on the average days at home after implementing the intervention.**

2.3.2. Nursing

- a) **Less nursing care than in the control group at 12 months but no significant effect at 6 months.**
This seems to be a good result but after inclusion 9% of the people have unmet needs. They were receiving nursing at inclusion but these services stopped in the period of six months. This cannot be justified by their profile since they are still in need of nursing care. Occupational therapy interventions also seem to have a stabilization effect because people continue to receive nursing services in the period of 12 months, which is in accordance with their ADL needs that did not change significantly between baseline and second evaluation.
- b) **Lower proportion and frequency of emergency visits in the period of 12 months but no difference in the period of 6 months.**
- c) **No change for hospitalizations and GP out-of-hours for the period of 6 and 12 months.**
- d) **A higher risk of death in the intervention group in the period of 6 and 12 months. No change for institutionalization.** Because the incidence of death is higher for the intervention group in the period of 6 and 12 months, we could conclude that the intervention group seems to be frailer than the control group.
- e) **The cost for the NIHDI**
- The estimated intervention cost was 62 euro per months per client.
 - The average cost of nursing care was significantly different after six months between treated and control. The costs were higher in the intervention group (617 euro versus 484 euro in the control group). However, the nursing cost was already significantly lower in the control group than in the intervention group at baseline. The costs did not change significantly for 6 months and 12 months between the intervention group. No change was observed between the two groups for 6 and 12 months.
 - In the period of 6 months, the cost paid for GP and specialist consultations was significantly higher in the intervention group than in the control group for 10% of the clients with the lowest costs. In the period of 12 months, these costs were lower for almost 80% of the clients in the intervention group.
 - No difference for the cost of hospitalization.
 - The costs incurred at home, there was no difference in the costs for 12 months.
 - When we include the costs of hospitalization and intervention, there was no difference in the costs at 6 months but the costs were higher in the intervention group for the period of 12 months (326 euro more). In the period of 12 months the costs for 70% of the clients are higher in the intervention group than in the control group.
- f) **The cost for the regions**
- There was a higher increase in the daycare costs for the control group than the intervention group in the period of 12 months (7 euro for the intervention group versus average of 26 euro for the control group). The difference was significant for 12 months but no difference was observed for six months.
 - No difference of cost for temporary institutionalizations was observed.
 - No difference in the cost of definitive institutionalizations was observed. The cost was 85 euro in the intervention group.
- g) **The cost for the clients**

- Daycare cost was significantly lower in the intervention group (2 Euro versus 7 Euro). The same difference was observed for 12 months.
 - For reimbursed health care services and nursing home, there was no difference in the 6 months and 12 months.
 - No difference for the cost of temporary institutionalizations. The average cost was 18 euro per month per client for six months after intervention.
 - The cost of definitive institutionalization was not significantly different in the 6 and 12 months. The average cost was 42 euro per month per client for six months after intervention.
- h)** For all stakeholders, the net cost was not significantly different for six months and slightly higher for 25% of clients in the 12 months period. In the period of 12 months this difference was 350 per month per client.
- i)** For the periods of 6 and 12 months, the average days at home was lower for the intervention group. When adjusting for the socio-economic status and the number of days alive, the average days at home was not different between the intervention group than in the control group

2.3.3. Hospital stay

- a) No difference for nursing care in the period of 6 and 12 months.** In the intervention group, the unmet needs remained for 62% of people with difficulties with hygiene tasks and for 36% of people with additional incontinence problems. This is a total of 35% of unmet needs for the whole intervention group, which is very high.
- b) Lower proportion and frequency of emergency visits in the period of 12 months and lower frequency of emergency visits in the period of 6 months.**
- c) A lower frequency of hospitalizations in the control group for the period of 6 months.**
- d) No difference for the GP out-of-hours visits.**
- e) No difference for the risk of institutionalization or death in the intervention group.**
- f) The costs for the NIHDI**
- The estimated intervention cost was 47 euro per months per client.
 - The average cost of nursing care significantly increased in the intervention group for the 12 months period (197 euro in the intervention group versus 66 euro per client per month in the control group). No change was observed between the two groups for six months. Both groups started at the same level. In the six months, the costs were respectively 174 and 65, but the difference was not significant.
 - The cost paid for GP and specialist consultations was no different between the two groups.
 - No difference for the cost of hospitalizations.
 - No difference for the costs incurred at home in the 6 and 12 months was observed (based on quantile regression). No calculations were possible for the estimation of the average difference of the total net cost.
- g) The costs for the regions**
- No difference for the costs of daycare was observed.
 - No difference for the costs of temporary institutionalizations in the 6 and 12 months.

- The cost of definitive institutionalizations was not significantly different for the periods of 6 and 12 months (57 euro in the intervention group versus 204 Euro in the control group for six months and respectively 101 Euro and 235 Euro for 12 months after intervention).

h) The costs for clients

- For reimbursed health care services, the costs were much lower in the intervention group for the period of 6 months for 15% of all clients. In 12 months, the difference was also high but for only 10% of the clients (lower costs in the intervention group).
- The cost of temporary stays in nursing home was significantly higher in the intervention group for the period of 6 months (15 versus 3 Euro in the control group). The difference is not significant anymore for 12 months.
- The cost of definitive institutionalizations was lower in the intervention group for 6 months (52 Euro in the intervention group versus 237 euro per client per month in the control group for six months). However the difference is not significant (small sample).

i) There was no difference in the cost for all stakeholders.

j) No difference of days spent at home was observed.

2.3.4. Hospital stay and nursing care

- a) Less nursing care than in the control group at 12 months but no significant effect at 6 months.**
This seems to be a good result but after inclusion 13% of the people have unmet needs. They were receiving nursing at inclusion but these services stopped in the period of six months. This cannot be justified by their profile since they are still in need of nursing care.
- b) Lower proportion and frequency of emergency visits in the period of 12 months and lower frequency of emergency visits in the period of 6 months.**
- c) A lower frequency of hospitalizations in the control group for the period of 12 months.**
- d) No difference for the GP out-of-hours visits.**
- e) No difference for the risk of institutionalization or death in the intervention group.**
- f) The cost for the NIHDI:**
- The estimated intervention cost was 66.7 euro per months per client.
 - The average cost of nursing care increased more in the control group for the period of 12 months. The nursing was slightly significantly lower in the intervention (434 versus 463 Euro in the control group). In the period of 6 months, there was no significant difference. The nursing costs for the period of 6 months were 487 euro but no change are observed between the two groups.
 - The cost paid for GP and specialist consultations was significantly lower in the intervention group than in the control group for about 5% of the clients for 6 months and for about 60% of the clients at 12 months.
 - The cost of hospitalizations was not different between the two groups.
 - For almost 20% of the intervention group, the net costs (incurred at home, intervention and hospitalizations) were slightly lower than in the control group for the period of 12 months. No

differences were found in the period of 6 months. No calculations were possible for the estimation of the average difference of the total net cost.

g) The cost for the regions:

- No change was observed for daycare cost.
- The costs of temporary institutionalizations was lower in the intervention group for the period of 6 and 12 months, but the difference was not significant. For the period of 6 months, the costs were 19 euro for the intervention group and 68 euro for the control group per month per client.
- The cost of definitive institutionalizations was significantly lower in the intervention group for the period of 6 months (7 Euro versus 121 Euro in the control group). The difference observed is not significant anymore for 12 months (94 euro versus 186 Euro in the control group).

h) The cost for the clients

- Concerning the reimbursed health care services and nursing home, the costs were not different between the two groups.
- No difference was observed on daycare cost.
- The costs of temporary institutionalizations were not significantly different in 6 and 12 months.
- The costs of definitive institutionalizations were lower in the intervention group for the period of 6 months. They were 7 euro for the intervention group and 105 for the control group. No difference was found for the period of 12 months.

i) The cost for all stakeholders, the net cost was not different between the two groups (based on the graph of the quantile regression).

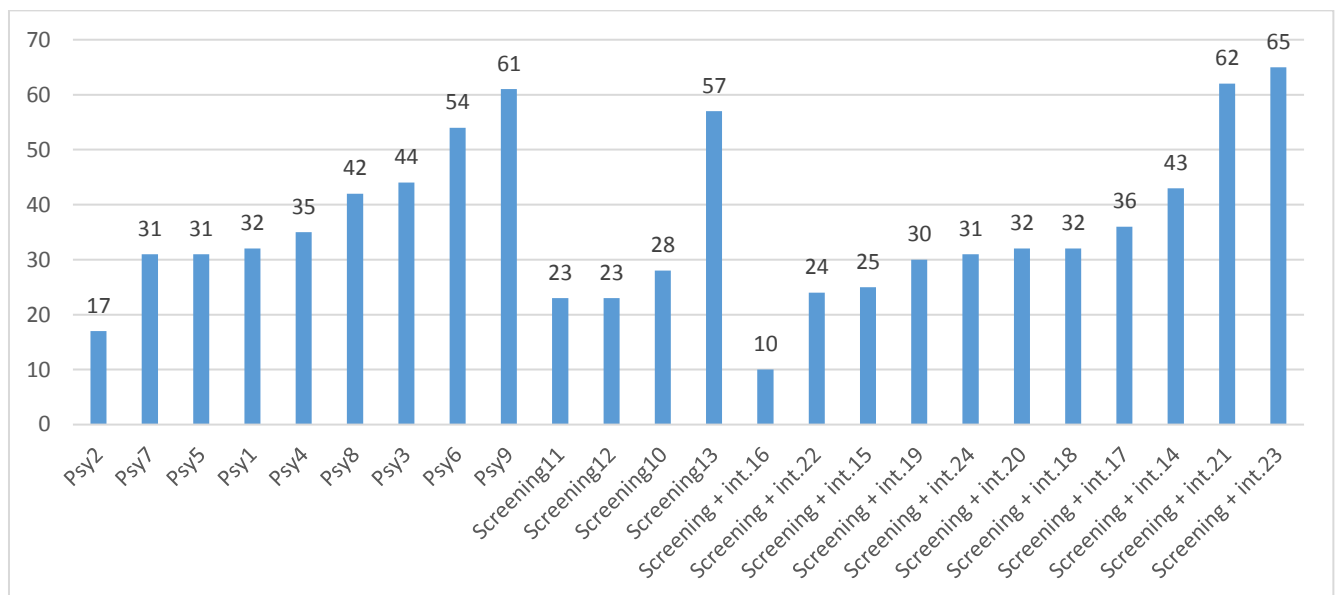
j) For the periods of 6 and 12 months, when adjusted, the average days at home was not different between the intervention group and the control group.

Chapter 3. Results of psychological support interventions

1. Cost of the interventions

The total clients per FTE varies between 17 to 61 per FTE the intervention of psychological support. The intervention of psychological screening with case management has on average between 23 to 57 client per FTE. For the intervention of psychological screening and psychological support, the number of client per FTE varies from 10 to 65.

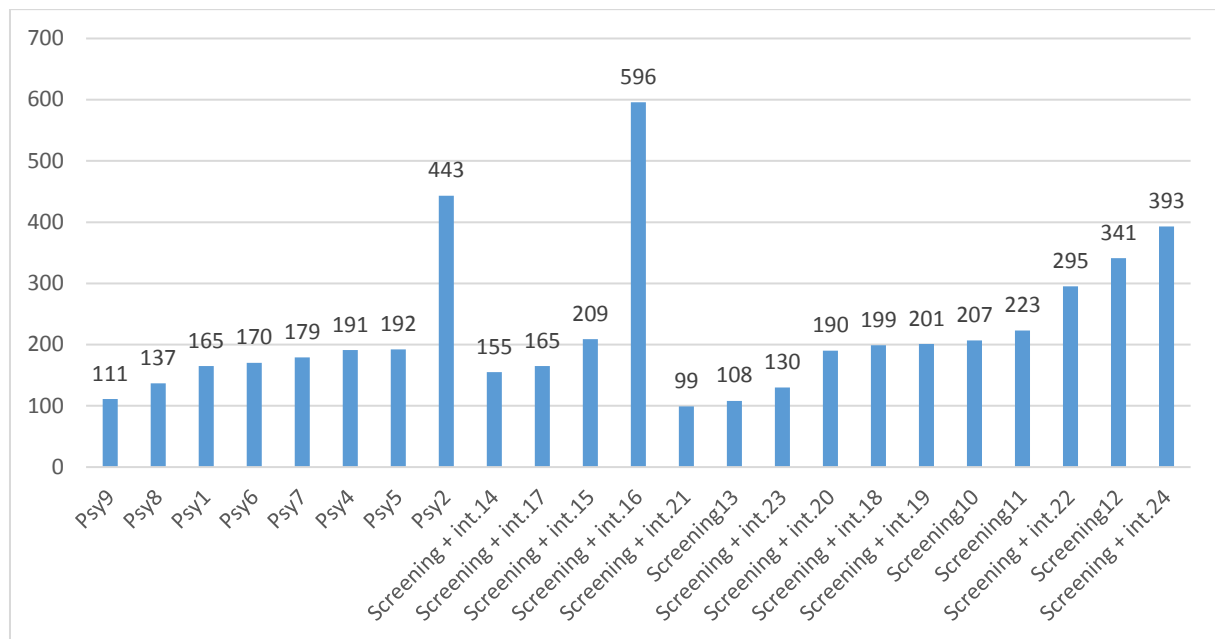
Figure 9 Total of clients per FTE of health care professionals for psychological support interventions



The monthly average cost per client significantly varies according to projects between 40 to 443 euro for psychological interventions, between 108 to 341 for the interventions of psychological screening, and between 99 to 596 for the psychological screening and psychological interventions. There was a great disparity of cost between projects.

The resources used not funded by the NIHDI represent in average 10% of the average cost for the NIHDI.

Figure 10 Average cost per client for the NIHD for psychological support interventions



2. Results of the effectiveness and the costs: Psychological support without case management

2.1. Description of the target population

2.1.1. Disability profiles

Description of disability profiles

The beneficiaries of psychological support without case management were clustered in three disability profiles:

- **Clients with low limitations:** low functional and cognitive impairments but 62% of this group had a score on the DRS scales above the cut-off. So the majority of this group suffered from significant depressive symptoms.
- **Clients with functional limitations:** 97% and 26% of this group had respectively a score of IADL and ADL scales above the cut-off of these scales. This group included clients with IADL limitations and initial cognitive impairments and clients with important functional limitations. For this reason, the proportion of clients with important limitation on ADL scale was limited compared to the profile functional limitations of the other type of interventions. About one-half of this group had initial cognitive impairments (with a CPs score between 1 and 2) and 16% of this group had CPS score above the cut-off which means a significant cognitive impairments. The depressive symptoms were also important in this group, with 59% of DRS scores above the DRS cut-off.

- **Clients with functional and cognitive impairments (with or without behavioral problems):** the clients in this group combined functional (with respectively 99% and 68% of the clients with a score on the IADL and ADL scales above the cut-off of these scales) , cognitive impairments (94% of the clients with a score on the CPS scale above the cut-off of this scale) , behavioral problems (65% of the clients had at least one behavioral problem), and depressive symptoms (55% of clients had a DRS score above the cut-off).

Description of socio-demographic characteristics

. In all three clusters there are differences in gender and age and the distribution of income. Concerning the income distribution, only the cluster functional impairment shows no important difference for the median income distribution. In the other two clusters the control group presents a higher proportion of the clients in the medium and higher median income than the intervention group.

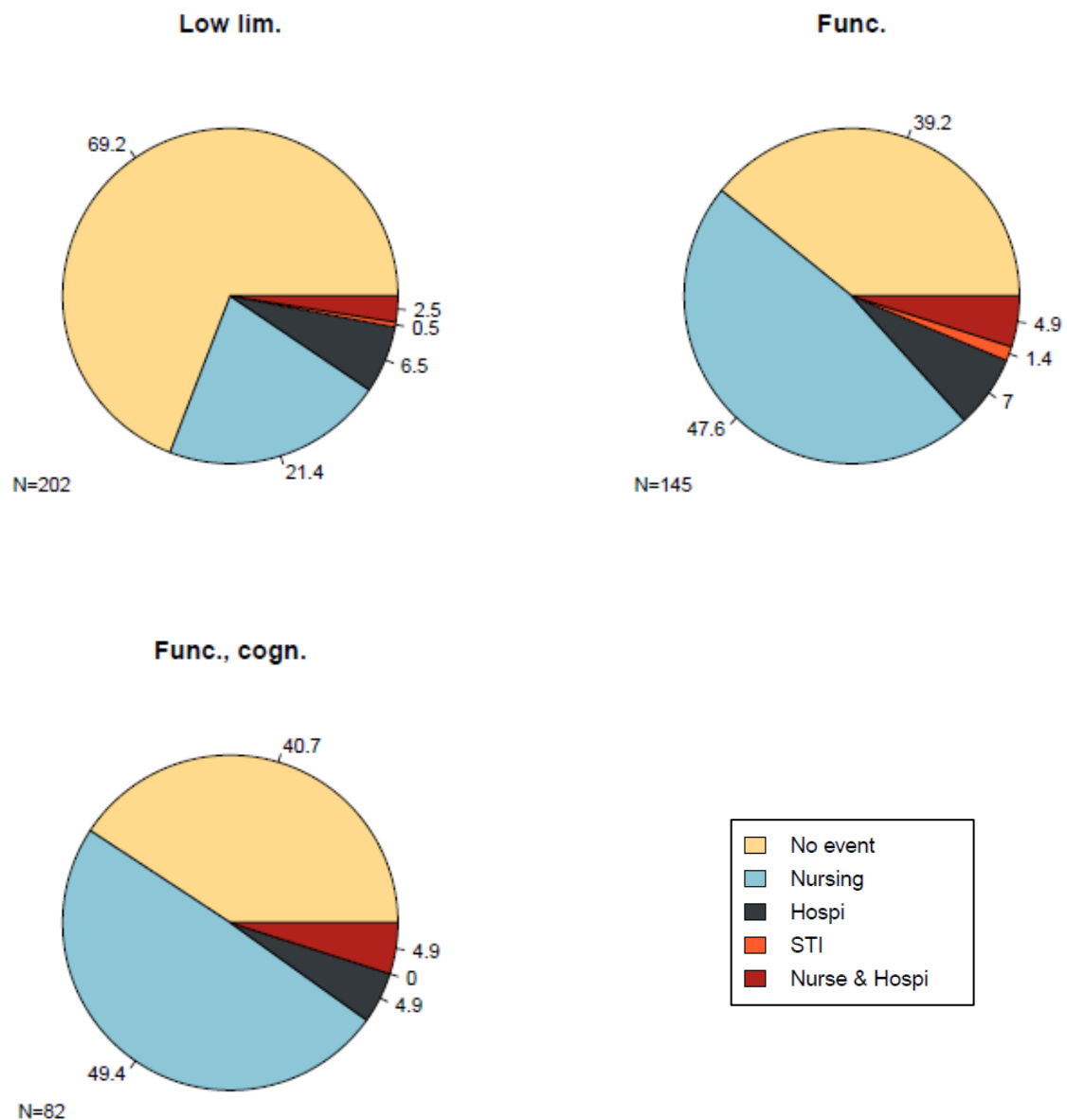
Table 4 Sociodemographic characteristics per disability profile for P1F0

	low limit.		func.		func., cogn.	
	T	C	T	C	T	C
Age						
Median[IQR]	76[68-83]	81[79-87]	77[70-84]	81[74-87]	81[73-85]	82[75-86]
Gender						
% Men	23.27	18.32	24.14	37.93	51.22	40.24
% Women	76.73	81.68	75.86	62.07	48.78	59.76
ICG						
% No ICG	44.55	46.53	28.28	28.97	0	0
% No cohabitant	37.13	35.15	39.31	38.62	24.39	24.39
% Cohabitant	18.32	18.32	32.41	32.41	75.61	75.61
Region						
Bruxelles	22.77	0	11.03	0	20.73	0
Flandre	38.61	33.17	53.79	44.83	62.2	64.63
Wallonie	38.61	66.83	35.17	55.17	17.07	35.37
Median income						
Low	41.09	21.78	35.17	38.62	25.61	20.73
Medium	43.07	48.02	44.14	40.69	63.41	45.12
High	15.84	30.2	20.69	20.69	10.98	34.15
N						
Unique value	202	48	145	93	82	45

The figure hereafter presents the key previous healthcare utilization pattern of population grouped by disability profiles. Following characteristics may be highlighted:

- The unmet need of nursing care was high at the inclusion in the psychological intervention. Indeed, half of the clients with functional limitations and half of the clients combining functional and cognitive impairments did not benefit of nursing care at the inclusion in the intervention.
- The clients with low limitations had, as it was expected, a low health care consumption at the inclusion in the intervention.

Figure 11 Description of the historic health care consumption profile per disability profile for P1F0



2.2. Results for the dependency groups

2.2.1. Low limitations

- a) **Less depressive symptoms and better quality of life.** The depressive symptoms decrease for almost 20% of the clients of the intervention group with a 2-point change in a scale of 14. The perceived quality of life was increased for 50% of the intervention group but this improve is limited up to 4 points in a scale of 66.
- b) **No effect for loneliness.** There is an improvement trend but it is not significant.

- c) A trend of increasing the burden in the intervention group.** The burden of informal caregivers (co-habitant or not) is higher in the intervention group for the informal caregivers at the highest levels of burden (above 15 in the Zarit scale). The worsening of the burden is higher for co-habitants than non-cohabitants.
- d) The proportion of use of nursing care is lower in the intervention group.** The intervention does not seem to be targeting all clients with difficulties in hygiene tasks and incontinence problems. Unmet needs remain at the second evaluation for respectively 41% and 44% of these clients, which are a total of 8% of the intervention group. These unmet needs were higher at the inclusion in the control group (17% of this group and 9% of the intervention group) but were totally covered in the control group during the period of six months after inclusion.
- e) A decrease of the proportion and the frequency of emergency visits.**
- f) A decrease in the proportion and frequency of hospitalizations.** The clients with low limitation probably use emergency and hospitalization for social reasons. The decrease of the use of emergency and hospitalizations could be explained by psychological support.
- g) No significant difference on the GP out-of-hours visits.**
- h) No significant difference on institutionalization or death.**
- i) The costs for the NIHDI**
- The estimated intervention cost was 160 euro in average per month per client.
 - The average cost of nursing care per month per client remained stable in the intervention group (63 euro at baseline and 67 euro in the 6 months period) but increased significantly in the control group (from 254 to 620 euro). The cost was not significantly different between the two groups for the 6 months period for the intervention group (after adjusting with the cost before intervention).
 - The cost paid for GP and specialist consultation was lower in the intervention group than in the control group in the period of 6 months for almost all clients.
 - The cost of hospitalizations was lower for almost 20% of the intervention group.
 - Concerning the costs at home, the total cost was lower in the intervention group for (159 euro per month per client less).
 - When including the costs of home care, hospitalization and intervention costs, the costs for the NIHDI were in average 337 euro less than in the control group. The costs were lower for 25% of the clients in the intervention group.
- j) The costs for the regions:**
- No significant difference for the cost of day care.
 - No significant difference for the cost of temporary institutionalization.
 - The cost of definitive institutionalization were significantly higher in the control group. This cost was 4 euro in intervention group and 30 euro in the control group in 6 months.
- k) The costs for the clients and informal carers:**
- For reimbursed health care services and nursing home, the costs were slightly lower in the intervention group for 40% of the clients.
 - No significant difference for the cost of day care or temporary institutionalization.
 - The cost of definitive institutionalization was significantly lower in the intervention group. This cost was 4 euro in the intervention group and 30 euro in the control group in 6 months.
 - There was a higher cost of family care in the intervention group but the costs were almost significantly higher before intervention.

- No significant difference for household aid or meals-on-wheels.
- l) For all stakeholders**, the costs were lower in the intervention group in the period of 6 months (on average 405 euro less). These costs were lower for almost 40% of all clients in the 6 months period.
- m)** There was no significant difference in the average days at home. After adjusting for the socio-economic status and the number of days alive, there was a very small difference for about 20% of the clients in the intervention group.

2.2.2. Functional

- a) Less depressive symptoms and better quality of life.** The level of depression decreased for 20% of the clients with depression score about 5 at the second evaluation. This decrease is a 2-point difference in a scale of 14. The perceived quality of life of almost 70% of the clients improved for maximum 4 points on a scales of 66.
- b) There is an improvement trend for loneliness but it is not significant.** The proportion of clients with loneliness was 28% of the intervention group and 37% of the control group at the second evaluation.
- c) Limited association with the burden of informal caregivers.** The burden of informal caregivers not living with the client is slightly decreased in the intervention group for informal caregivers at high burden (above 18). On the contrary, for co-habitants, there is an increase in burden for 15% of the informal caregivers with burden above 17.
- d) The proportion of use of nursing care is lower in the intervention group.** At inclusion, 30% of the clients with difficulties in hygiene tasks and 40.5% of the clients with additional incontinence problems received no nursing care (22% of the intervention group). At the second evaluation the percentage of unmet needs decreased respectively to 19% and 26% (about 14% of the intervention group). In the control group, the unmet needs were 16% of the whole control group at the inclusion and decrease to 1% during the period of six months after inclusion. However, during the six months after inclusion, 70% of the clients without hygiene tasks difficulties and incontinence received nursing care in the control group for only 37% of this group of clients in the intervention group.
- e) A decrease in the frequency of emergency visits.** The emergency visits are lower among the users of emergency services in the intervention group.
- f) An increase in the frequency and proportion of hospitalizations.**
- g) No significant difference on the GP out-of-hours visits.**
- h) No significant difference on institutionalization or death.**
- i) The costs for the NIHDI**
 - The estimated intervention cost was 143.5 euro per months per client.
 - The average cost of nursing care was significantly different after six months between treated and control. The costs were lower in the intervention group (184 euro versus 963 euro in the control group in average per month). The cost was significantly lower in the 6 months period for the intervention group for 80% of the clients.
 - In the period of 6 months, the cost paid for GP and specialist consultations was significantly lower in the intervention group than in the control group for all clients.
 - The cost of hospitalizations was not different between the two groups.
 - The costs incurred at home (NIHDI) were lower in the intervention group (average 376 euro per client per month less than in the control group) in the period of 6 months.

- When we include the costs of hospitalization and intervention, the costs in the 6 months period were lower in the intervention group for the period of 6 months (579 euro less). The costs were lower for 90% of clients.
- j) The costs for the regions**
- No difference of daycare cost was observed.
 - There was no difference in the cost of temporary institutionalizations. The average cost was 10 euro in the intervention group in the period of 6 months.
 - There was no significant difference in the cost of definitive institutionalizations. The average cost was 36 euro for six months after intervention.
- k) The costs for the clients and informal carers**
- For reimbursed health care services and nursing home, the costs were slightly lower for almost 60% of the intervention group in the 6 months after the intervention.
 - No difference was observed for daycare and temporary stays in nursing home.
 - No significant difference for the cost of definitive institutionalization. The average cost was 30 euro per month per client for the period of six months.
 - The cost of family care was not significantly different between the two groups.
 - The cost of household aid and meals-on-wheels was not significantly different in the period of 6 months.
- l) For all stakeholders**, the net cost was significantly lower in the intervention group: 655 euro in the period of 6 months compared to the control group. These costs were significantly lower for all clients in the intervention group for the 6 months period.
- m)** For the periods of 6 months, there was no difference on the average days at home, even when adjusting for the socio-economic status and the number of days alive.

2.2.3. Functional and cognitive impairment

- a) Trend to better quality of life.** For 35% of the clients there was an improvement in perceived quality of life but the decrease in depression scores is very low.
- b) Limited decrease of the burden.** There is no significant difference on the burden perceived by informal caregivers not living with the client. For 20% of the co-habitants there is a significant decrease of the burden (around the cut-off of 10) of up to 2 points on a scale of 48.
- c) The proportion of use of nursing care is lower in the intervention group.** The proportion of clients with no limitations receiving nursing care stayed stable in the intervention group and concerned 22% of this group (2.5% of the total intervention group). In contrast, in the control group, all clients with no hygiene tasks limitations and or incontinence received nursing care at the second evaluation which represented 5% of the control group. At inclusion, 56% of the clients with difficulties in hygiene tasks and 41% of the clients with additional incontinence problems received no nursing care (39% of the intervention group). At the second evaluation the percentage of unmet needs decreased respectively to 33% and 22% (about 22.5% of the intervention group). Unmet needs remain and there is still need for improvement. In the control group, the unmet need decreased from 15% to 6% between the inclusion and the second evaluation.
- d) A slight decrease in the frequency of emergency visits.**
- e) A slight increase in the frequency of hospitalizations.**

f) No significant difference on the GP out-of-hours visits.

g) No significant difference on institutionalization or death.

h) The costs for the NIHDI

- The estimated intervention cost was 112.2 euro per months per client.
- The average cost of nursing care was significantly different after six months between treated and control. The costs were lower in the intervention group (453 euro versus 1640 euro in the control group). The cost was significantly lower for 90% of the clients. However, the nursing cost was already significantly lower in the intervention group at baseline.
- In the period of 6 months, the cost paid for GP and specialist consultations was significantly lower in the intervention group than in the control group for 90% of the clients.
- The cost of hospitalizations was not significantly different.
- The costs incurred at home (NIHDI) were lower in the intervention group (average 613 euro per client per month less than in the control group) in the period of 6 months.
- When we include the costs of hospitalization and the cost of the intervention, the costs in the 6 months period were lower in the intervention group (692 euro less). The costs were lower for 80% of the intervention group.

i) The costs for the regions

- There was no difference in the cost of temporary institutionalizations. The average cost was 49 euro in the intervention group in the period of 6 months.
- There was no significant difference in the cost of definitive institutionalizations. The average cost was 60 euro for six months after intervention.

j) The costs for the clients and informal carers

- For reimbursed health care services and nursing home, there was no difference in the 6 months after the intervention.
- There was no difference for the cost of temporary institutionalizations for six months after the intervention (45 euro per month per client in the intervention group).
- No significant difference for the cost of definitive institutionalization. The average cost was 54 euro per month per client for the period of six months.
- No difference on the cost of family care was observed.
- The cost of household aid and meals-on-wheels was not significantly different in the period of 6 months.

k) The net cost for all stakeholders was not significantly different between the intervention group and the control group. When these costs were adjusted according to socio economic status and numbers of days alive, these costs were significantly lower for almost 50% of the clients in the intervention group for the 6 months period.

l) There was no difference on the average **days at home in the period of 6 months, even when adjusting for the socio-economic status and the number of days alive.**

3. Results of the effectiveness and the costs: psychological screening with case management

3.1. Description of the target population

3.1.1. Disability profiles

Description of disability profiles

The beneficiaries of psychological screening with case management were clustered in three disability profiles:

- **Clients with low limitations:** low functional and cognitive impairments but 24% of this group had a score on the DRS scales above the cut-off. So the majority of this group suffered from significant depressive symptoms.
- **Clients with functional limitations:** 92% and 52% of this group had respectively a score of IADL and ADL scales above the cut-off of these scales. This group included clients with IADL limitations and initial cognitive impairments and clients with important functional limitations. For this reason, the proportion of clients with important limitation on ADL scale was limited compared to the profile functional limitations of the other type of interventions. The totality of this group had initial cognitive impairments (with a CPS score between 1 and 2 for one half of the group) and 10% of this group had CPS score above the cut-off which means a significant cognitive impairments. The depressive symptoms were also important in this group, with 42% of DRS scores above the DRS cut-off.
- **Clients with functional and cognitive impairments (with or without behavioral problems):** the clients in this group combined functional (with respectively 100% and 83% of the clients with a score on the IADL and ADL scales above the cut-off of these scales) , cognitive impairments (98% of the clients with a score on the CPS scale above the cut-off of this scale) , behavioral problems (35% of the clients had at least one behavioral problem), and depressive symptoms (32% of clients had a DRS score above the cut-off).

Description of socio-demographic characteristics

The main differences are in gender and age situation in the last cluster (functional and cognitive impairment). Unlike the other interventions, the income distribution shows that the intervention group has a large proportion of clients in the medium income groups and that a larger proportion of the control group is in the lower income groups.

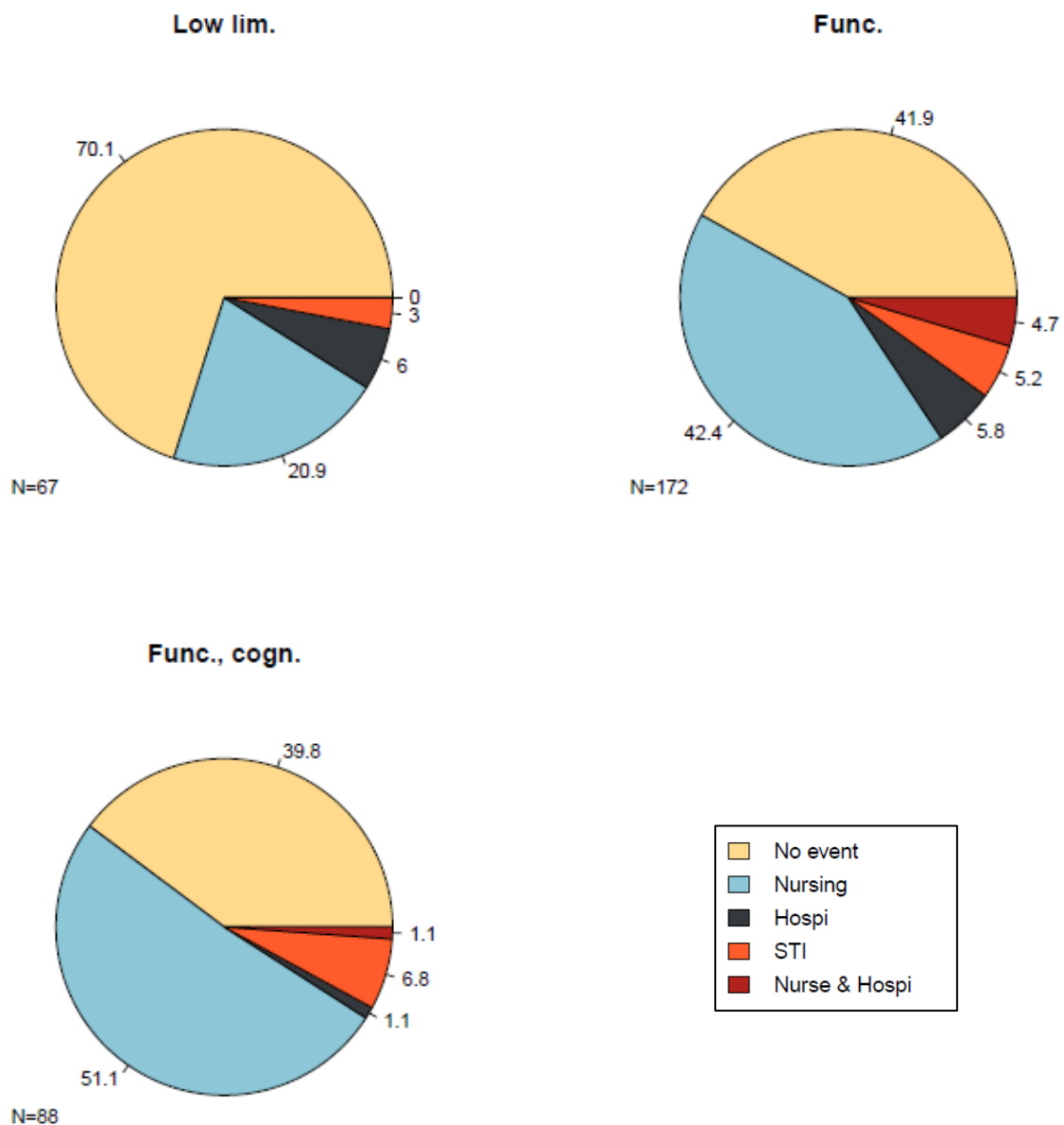
Table 5 Sociodemographic variables for each disability profile for P1 screening

	low limit.		func.		func., cogn.	
	T	C	T	C	T	C
Age						
Median[IQR]	82[78-86]	81[78-85]	82[77-88]	82[77-87]	82[72-86]	85[78-88]
Gender						
% Men	28.36	14.93	36.05	29.07	34.09	23.86
% Women	71.64	85.07	63.95	70.93	65.91	76.14
ICG						
% No ICG	47.76	47.76	25.58	25.58	0	0
% No cohabitant	43.28	43.28	44.77	44.77	32.95	32.95
% Cohabitant	8.96	8.96	29.65	29.65	67.05	67.05
Region						
Bruxelles	22.39	0	11.05	0	5.68	0
Flandre	0	50.75	6.4	62.21	17.05	71.59
Wallonie	77.61	49.25	82.56	37.79	77.27	28.41
Median income						
Low	49.25	25.37	53.49	29.07	39.77	12.5
Medium	50.75	49.25	42.44	49.42	53.41	51.14
High	0	25.37	4.07	21.51	6.82	36.36
N						
Unique value	67	28	172	111	88	50

The figure hereafter presents the key previous healthcare utilization pattern of population grouped by disability profiles. Following characteristics may be highlighted:

- The unmet need of nursing care was high at the inclusion in the psychological intervention. Indeed, half of the clients with functional limitations and half of the clients combining functional and cognitive impairments did not benefit of nursing care at the inclusion in the intervention.
- The clients with low limitations had, as it was expected, a low health care consumption at the inclusion in the intervention.

Figure 12 Description of the historic health care consumption profile per disability profile for P1 screening



3.2. Results for the disability groups

3.2.1. Low limitations

- a) **Limited difference of depressive status.** For 10% of the clients with low depression score in the intervention group, a decrease of depression score with a 2-point change in a scale of 14 was observed. For clients with a higher score (around 5), the depression scores had a trend to increase but this increase was not significant. The perceived quality of life of about 20% of the clients largely improved with up to 10 points in a scale of 66.

- b) A decrease of the quality of life** was observed for clients with a perceived quality of life above 30 on Whoql score.
- c) No significant difference for loneliness.**
- d) The unmet needs for nursing care were of 22% at the inclusion and were covered during the six months after inclusion in the intervention.**
- e) No significant difference was found for the proportion of emergency visits, GP out-of-hours visits and hospitalization.**
- f) No death or institutionalization occurred in this period.**
- g) For the NIHDI**
 - The estimated intervention cost was 110.1 euro in average per month per client.
 - The average cost of nursing care per month per client was lower in the intervention group in the period of 6 months (average of 380 euro per client per month versus 576 euro in the control group). However these costs were also lower for the intervention group at baseline. After adjusting for socio-economic status and days alive, these costs are higher in the intervention group for almost 50% of the clients.
 - The cost paid for GP and specialist consultation was higher in the period of 6 months for almost 60% of the clients but the difference was small (lower than 50 euro per month per client).
 - No difference in the cost of hospitalization.
 - Concerning the costs at home, the total cost was not different between the intervention group and the control group.
 - When including the costs of home care, hospitalization and intervention costs, the costs for the NIHDI were still not significantly different between the intervention group and control group.
- h) For the regions:**
 - No significant difference for the cost of day care and temporary institutionalization.
 - The cost of definitive institutionalization were not significantly different between the intervention group and the control group. This cost was 19 euro in intervention group in the period of 6 months.
- i) For the clients and informal carers:**
 - For reimbursed health care services, the total cost was not significantly different in the intervention group.
 - The cost of day care is not different between the two groups.
 - No significant difference for the cost temporary institutionalization.
 - No significant difference for the costs of definitive institutionalization. The average cost was 21 euro per client per month.
 - The cost of family care was significantly different for the period of 6 months. The costs are higher in the intervention group.
The cost of household aid and meals-on-wheels are significantly higher in the intervention group in the period of 6 months .
- j) For all stakeholders,** the costs were not significantly different in the period of 6 months.
- k) There was no significant difference in the average days at home (even when adjusting for the socio-economic status and the number of days alive).**

3.2.2. Functional

- a) **Slight improvement of the quality of life in the intervention group.** The intervention has a positive effect at improving quality of life for almost 5% of the clients with a change of 2 points in 66. For 20% of the clients there is a slight improvement (of 1 point in 48) in depression.
- b) **No significant difference for loneliness.**
- c) **A significant decrease of the burden of informal caregiver** was shown for 30% of the informal caregivers with a value above 10 on the Zarit scale and up to 4 points change on 48. **No significant difference on the burden of informal caregivers.**
- d) **No significant difference on the use of nursing care.** At the second evaluation, the percentage of unmet needs is 25% for clients with problems in performing hygiene tasks and 19% for people with additional incontinence problems. This is 19% of the intervention group. This percentage was 60% at inclusion. In the control group this percentage decreased from 10% at the inclusion to 1% during the six months after.
- e) **An increase in the proportion of emergency visits.**
- f) **An increase in the proportion and frequency of hospitalizations.** The proportion of emergency visits was lower in the intervention group and there were more hospitalizations among the users of these services in the intervention group than in the control group.
- g) **No significant difference on the GP out-of-hours visits.**
- h) **No significant difference on institutionalization or death.**
- i) **The cost for the NIHDI**
 - The estimated intervention cost was 120 euro per months per client.
 - The average cost of nursing care was significantly different after six months between treated and control. The costs were lower in the intervention group (163 euro versus 682 euro in the control group). However, the nursing cost was already significantly lower in the intervention group at baseline. The cost was significantly lower in the 6 months period for the intervention group for almost 20% of the clients.
 - No significant difference for the cost paid for GP and specialist consultations.
 - The cost of hospitalization was higher for 20% of the clients in the intervention group.
 - The costs incurred at home (NIHDI) were not significantly different between the intervention group and the control group.
 - Even when the costs of hospitalization and intervention are added to the costs incurred at home, the costs in the 6 months was still not different between the intervention group and the control group.
- j) **The cost for the regions**
 - There was no difference in the cost of day care
 - No significant difference was observed for temporary stays in nursing home.
 - There was no significant difference in the cost of definitive institutionalizations. The average cost was 27 euro for six months after intervention.
- k) **The cost for the clients and informal carers**
 - For reimbursed health care services and nursing home, the costs were significantly higher in the intervention group for 70% of the clients. The difference was lower than 100 euro per month per client.
 - No significant difference for the cost of temporary institutionalizations (23 euro per month per client).
 - No significant difference for the cost of definitive institutionalization. The average cost was 40 euro per month per client for the period of six months.

- The cost of family care was significantly lower in the intervention group for the period of 6 months.
 - The costs of household aid and meals-on-wheels were not significantly different in the period of 6 months.
- l) For all stakeholders**, the costs were not significantly different in the period of 6 months.
- m)** For the periods of 6 months, there was no difference on the average days at home, even when adjusting for the socio-economic status and the number of days alive.

3.2.3. Functional and cognitive impairment

- a) No significant difference on depression or quality of life.**
- b) No significant difference on burden of informal caregivers.**
- n) The intervention seems to be targeting well clients with nursing care needs.** From the 85% of clients with difficulties in hygiene tasks not receiving nursing care and 68.5% with additional incontinence also not receiving nursing care (67% of the intervention group), only 15% of the intervention group remains with unmet needs (30% with hygiene problems and 11% with additional incontinence problems). In the control group, the unmet needs decreased from 21% of this group at the inclusion to 0% during the first six months .
- c) No significant difference on emergency visits.**
- d) No significant difference in the frequency of hospitalizations.**
- e) No significant difference on the GP out-of-hours visits.**
- f) No significant difference on institutionalization**
- g) The intervention group died significantly more than the control group.**
- h) For the NIHDI**
- The estimated intervention cost was 99.1 euro per months per client.
 - The average cost of nursing care per month per client was lower in the intervention group in the period of 6 months (average of 1135 euro per client per month versus 1692 euro in the control group). However these costs were also lower for the intervention group at baseline.
 - No significant difference for the cost paid for GP and specialist consultations.
 - The cost of hospitalization was higher in the intervention group for the period of 6 months. This was observed for 5% of the intervention group.
 - No significant difference for the costs incurred at home (NIHDI).
 - When we included the costs of hospitalization and the cost of the intervention, the costs in the 6 months period were still not significantly different between the intervention group and the control group.
- i) For the regions**
- There was no difference in the cost of day care.
 - The cost of temporary institutionalizations increased more in the control group than in the intervention group, but the difference between the two groups after intervention is not significant.
 - There was no significant difference in the cost of definitive institutionalizations. The average cost was 83 euro for six months after intervention.
- j) For the clients and informal carers**

Chapter 3 Results of psychological support interventions

3 Results of the effectiveness and the costs: psychological screening with case management

- For reimbursed health care services, the costs were significantly higher in the intervention group for 30% of the clients. The difference was lower than 100 euros per month per client.
 - There was no difference for the cost of temporary institutionalizations for six months after intervention.
 - No significant difference for the cost of definitive institutionalization.
 - No significant difference for the cost of family care for the period of 6 months.
 - The costs of household aid and meals-on-wheels were not significantly different in the period of 6 months.
- k)** The net cost for all stakeholders was not significantly different between the intervention group and the control group.
- l)** There was no difference on the average days at home in the period of 6 months, even when adjusting for the socio-economic status and the number of days alive.

4. Results of the effectiveness and the costs: Psychological screening and psychological intervention with or without case management

4.1. Description of the target population

4.1.1. Disability profiles

Description of disability profiles

The beneficiaries of Psychological screening and psychological intervention with or without case management were clustered in three disability profiles:

- **Clients with low limitations:** low functional and cognitive impairments but 71% of this group had a score on the DRS scales above the cut-off. So the majority of this group suffered from significant depressive symptoms.
- **Clients with functional limitations:** 93% and 52% of this group had respectively a score of IADL and ADL scales above the cut-off of these scales. This group included clients with IADL limitations and initial cognitive impairments and clients with important functional limitations. For this reason, the proportion of clients with important limitation on ADL scale was limited compared to the profile functional limitations of the other type of interventions. One half of this group had any cognitive impairment and only 14% of this group had CPS score above the cut-off which means a significant cognitive impairments. The depressive symptoms were also important in this group, with 48% of DRS scores above the DRS cut-off.
- **Clients with functional and cognitive impairments (with or without behavioral problems):** the clients in this group combined functional (with respectively 100% and 88% of the clients with a score on the IADL and ADL scales above the cut-off of these scales) , cognitive impairments (88% of the clients with a score on the CPS scale above the cut-off of this scale) , behavioral problems (49% of the clients had at least one behavioral problem), and depressive symptoms (53% of clients had a DRS score above the cut-off).

Description of socio-demographic characteristics

The main differences are in the category of median income. A very high proportion of the intervention group is in the high median income group, while the highest proportion of the control group is in the medium income groups.

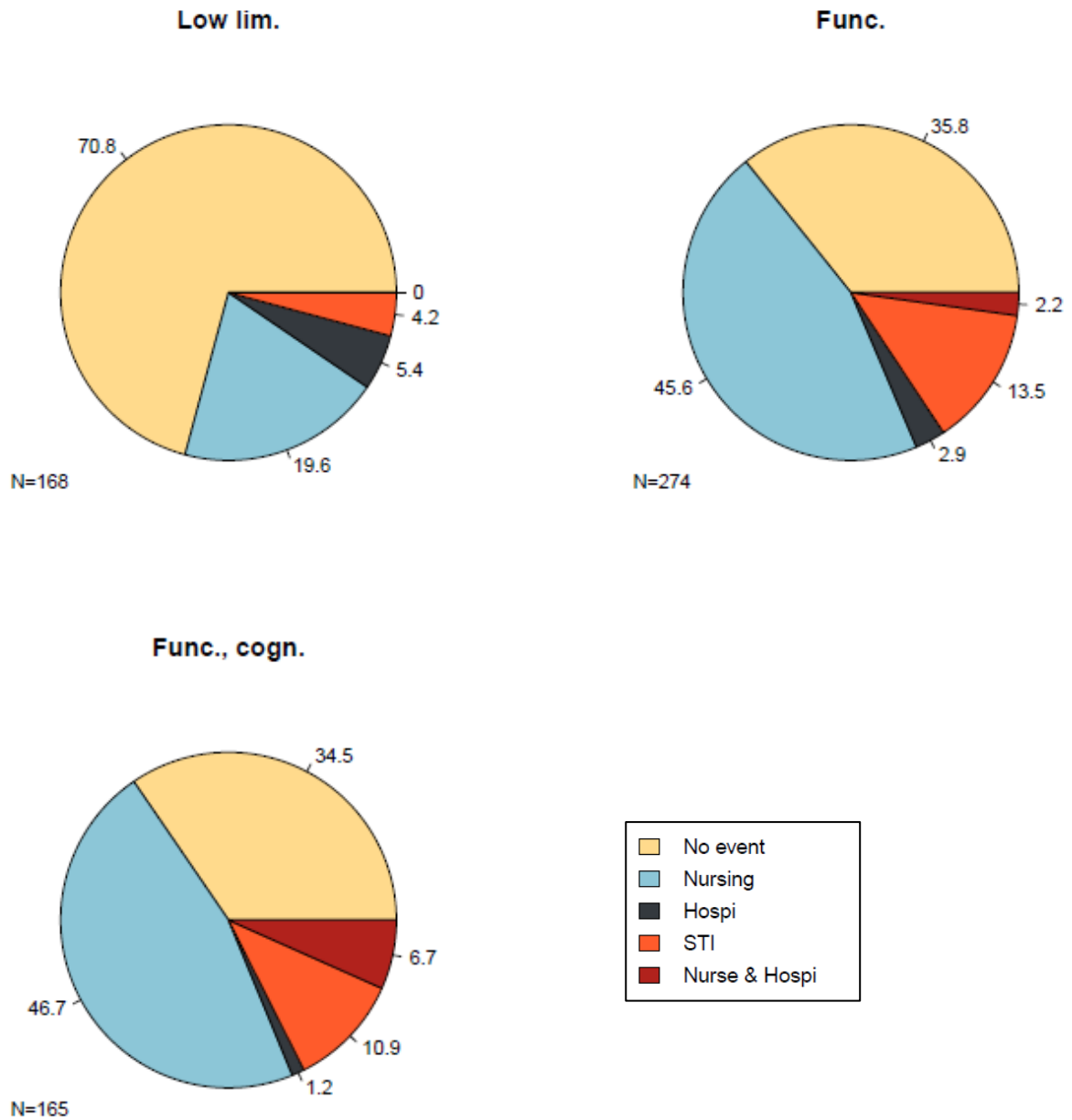
Table 6 Sociodemographic characteristics per disability profile for P1 screening + intervention

	low limit.		func.		func., cogn.	
	T	C	T	C	T	C
Age						
Median[IQR]	76[71-82]	81[77-87]	81[73-85]	82[77-87]	83[76-87]	82[75-87]
Gender						
% Men	17.26	19.05	23.36	22.26	36.36	31.52
% Women	82.74	80.95	76.64	77.74	63.64	68.48
ICG						
% No ICG	48.81	48.21	13.14	13.14	0	0
% No cohabitant	42.26	42.86	63.5	63.5	47.88	47.88
% Cohabitant	8.93	8.93	23.36	23.36	52.12	52.12
Region						
Bruxelles	0.6	0	0	0	0	0
Flandre	29.76	41.07	62.04	59.12	74.55	67.27
Wallonie	69.64	58.93	37.96	40.88	25.45	32.73
Median income						
Low	44.05	22.02	28.1	29.56	14.55	18.79
Medium	35.12	47.62	21.17	38.69	32.12	43.64
High	20.83	30.36	50.73	31.75	53.33	37.58
N						
Unique value	168	48	274	153	165	69

The figure hereafter presents the key previous healthcare utilization pattern of population grouped by disability profiles. Following characteristics may be highlighted:

- The unmet need of nursing care was high at the inclusion in the psychological intervention. Indeed, half of the clients with functional limitations and half of the clients combining functional and cognitive impairments did not benefit of nursing care at the inclusion in the intervention.
- The clients with low limitations had, as it was expected, a low health care consumption at the inclusion in the intervention.
- The proportion of clients using the short-term institutionalization is high at the inclusion in this project. That can be explained by a specific disability profile of the clients or the umbrella organisation.

Figure 13 Description of the historic health care consumption profile per disability profile for P1 screening + intervention



4.2. Results for the disability groups

4.2.1. Low limitations

- a) **Less depressive symptoms and better quality of life.** The depressive symptoms decrease for 15% of the clients of the intervention group with a 2-point change in a scale of 14. This is observed for people with DRS score above 7 at the second evaluation. The perceived quality

of life was increased for 10% of the intervention group with a score of 31 and for almost 10% with a score of 38 at the second evaluations. The decrease is very limited.

b) No significant difference for loneliness or the burden of informal caregivers.

c) The proportion of use of nursing care is lower in the intervention group. The intervention does not seem to be targeting all clients with difficulties in hygiene tasks and incontinence problems. Unmet needs remain at the second evaluation for respectively 44% and 40% of these clients, which are a total of 8.4% of the intervention group. These unmet needs were 12.6% in the control group at inclusion and 13.8% in the intervention group. At the second evaluation the unmet needs in the control group were almost totally covered (0.6).

d) A decrease of the proportion and the frequency of emergency visits.

e) An increase in the proportion and frequency of GP out-of-hours visits.

f) There is a trend for less hospitalizations but this is not significant.

g) No significant difference on institutionalization and no deaths occurred.

h) The costs for the NIHDI

- The estimated intervention cost was 229.6 euro in average per month per client.
- The average cost of nursing care per month per client was lower in the intervention group in the period of 6 months (average of 181 euro per client per month versus 556 euro in the control group). However these costs were also lower for the intervention group at baseline.
- The cost paid for GP and specialist consultation was higher in the period of 6 months for almost 40% of the clients in the intervention group but the difference was small (lower than 50 euro per month per client).
- The cost of hospitalization was not significantly different.
- Concerning the costs at home, the total cost was not different between the intervention group and the control group.
- When including the costs of home care, hospitalization and intervention costs, the costs for the NIHDI were still not significantly different between the intervention group and control group. However, when adjusting for socio-economic status and days alive, for 20% of the clients the costs are higher than in the control group. These are the clients with the highest costs (difference of about 500 euro per month).

i) The costs for the regions:

- No significant difference for the cost of day care and temporary institutionalization.
- The cost of definitive institutionalization was not significantly different between the intervention group and the control group. This cost was 10 euro in intervention group in the period of 6 months.

j) The costs for the clients and informal carers

- For reimbursed health care services, there were no significant differences between the intervention and the control group.
- The cost of day care was higher in the control group than in the intervention group for 6 months after baseline.
- The cost temporary institutionalization was not different between the two groups.
- No significant difference for the costs of definitive institutionalization. The average cost was 14 euro per client per month.
- The cost of family care decreased more in the control group than in the intervention group for the period of 6 months.
- No significant differences for the cost of household aid and meals-on- in the period of 6 months.

- k) **The costs for all stakeholders**, the costs were not significantly different in the period of 6 months.
- l) There was no difference on the average days at home in the period of 6 months, even when adjusting for the socio-economic status and the number of days alive.

4.2.2. Functional

- a) **No changes for depression and a limited improvement of quality of life.** The intervention is not associated with any change in the level of depression. The perceived quality of life of almost 10% of the clients is slightly improved for people with a score higher than 25 at the second evaluation.
- b) **There is no change for loneliness.**
- c) **Limited increase in the burden of co-habitant informal caregivers.** There is a slight increase in burden for informal caregivers living with the older person. This is the case for a burden score of 6 or higher at the second evaluation (30% of the clients).
- d) **The proportion of use of nursing care decreased in the intervention group.** At inclusion, 64% of the clients with difficulties in hygiene tasks and 58% of the clients with additional incontinence problems received no nursing care (41% of the intervention group with unmet needs). At the second evaluation the percentage of unmet needs decreased respectively to 31% and 25% (about 19% of the intervention group). In the control group the unmet needs were 11% at the inclusion and decrease to 0.7% during the period of six months after inclusion. However, during the six months after inclusion, 69.7% of the clients without hygiene tasks difficulties and incontinence received nursing care in the control group for only 32.4% of this group of clients in the intervention group.
- e) **No difference for hospitalizations or emergency visits.**
- f) **There is a slight increase in the GP out-of-hours visits.**
- g) **No significant difference on institutionalization or death.**
- h) **The costs for the NIHDI**
 - The estimated intervention cost was 241.5 euro per months per client.
 - The average cost of nursing care was significantly different after six months between treated and control. The costs were lower in the intervention group (714 euro versus 1138 euro in the control group). However, the nursing cost was already significantly lower in the intervention group at baseline.
 - No significant difference for the cost paid for GP and specialist consultations.
 - No significant difference for the cost of hospitalization.
 - The costs incurred at home (NIHDI) were not significantly different between the intervention group and the control group.
 - Even when the costs of hospitalization and intervention are added to the costs incurred at home, the costs in the 6 months were still not different between the intervention group and the control group.
- i) **The costs for the regions**
 - No difference was observed for daycare.
 - The cost of temporary institutionalizations was not different between the two groups.
 - There was no significant difference in the cost of definitive institutionalizations.
- j) **The costs for the clients and informal carers**

- For reimbursed health care services and nursing home, there were no significant differences between the intervention and the control group.
 - No significant difference for the cost of temporary institutionalizations (28 euro per month per client in the intervention group).
 - No significant difference for the cost of definitive institutionalization (23 euro per month per client in the intervention group).
 - No significant difference for the cost of family care for the period of 6 months. These costs remained stable during the period of 6 months.
 - The costs of household aid and meals-on-wheels were not significantly different in the period of 6 months.
- k) For all stakeholders**, the costs were not significantly different in the period of 6 months.
- l)** For the period of 6 months, there was no difference on the average days at home, even when adjusting for the socio-economic status and the number of days alive.

4.2.3. Functional and cognitive impairment

- a) Trend to better quality of life and less depressive symptoms.** For almost 10% of the clients there is a slight improvement in the depression score and for about 5% of the clients there is a limited improvement in the perceived quality of life. In both cases this improvement is very low.
- b) Limited decrease in burden.** For 30% of no co-habitant informal caregivers and for 15% of co-habitants there is a decrease in burden of up to 2 points in a scale of 48. This is mostly for people with burden lower than the cut-off of the Zarit scale.
- c) The proportion of use of nursing care is lower in the intervention group.** The proportion of people with no limitations for hygiene tasks or incontinence receiving nursing care decreased from 25% to 0% while in the control group all people with no limitations for hygiene or incontinence still receive nursing care. At inclusion, 50% of the clients with difficulties in hygiene tasks and 54% of the clients with additional incontinence problems received no nursing care (42% of the intervention group). At the second evaluation the percentage of unmet needs decreased respectively to 34% and 28% (about 24% of the intervention group). Unmet needs remain and there is still need for improvement. In the control group, the unmet needs decreased from 19% to 2.5% between the inclusion and the second evaluation.
- d) An increase in the use of day-care centers.** This is a good result from the project because the population in this cluster has cognitive impairment and day-care services are recommended for this profile of clients.
- e) No differences for hospitalizations or emergency visits.**
- f) There is a slight increase in GP out-of-hours visits.**
- g) No significant difference on institutionalization or death.**
- h) The costs for the NIHDI**
- The estimated intervention cost was 256 euro per months per client.
 - The average cost of nursing care per month per client was lower in the intervention group in the period of 6 months (average of 1155 euro per client per month versus 1715 euro in the control group). However these costs were also lower for the intervention group at baseline. After adjusting for socio-economic status and days alive, these costs were higher for 10% of the intervention group in the period of 6 months.
 - No significant difference for the cost paid for GP and specialist consultations.

- The cost of hospitalization was higher in the intervention group in the period of 6 months. These costs increased in the intervention group while they decreased in the control group. After adjusting for socio-economic status and days alive, the differences were no longer significant.
 - No significant difference for the costs incurred at home (NIHDI).
 - When we included the costs of hospitalization and the cost of the intervention, the costs in the 6 months period were still not significantly different between the intervention group and the control group.
- i) The costs for the regions**
- The cost of daycare was higher in the control group (28 vs 12 euro).
 - No significant difference for the cost of temporary institutionalizations in the period of 6 months.
 - There was no significant difference in the cost of definitive institutionalizations. The average cost was 107 euro for six months after intervention.
- j) The costs for the clients and informal carers**
- For reimbursed health care services and nursing home, the costs were significantly higher in the intervention group for almost 20% of the clients. The difference was between 100 and 200 euro per month per client.
 - The cost of day care is higher in the intervention group than in the control group (13 vs 1 euro).
 - There was no difference for the cost of temporary institutionalizations for six months after the intervention (44 euro per month per client in the intervention group).
 - No significant difference for the cost of definitive institutionalization. The average cost was 93 euro per month per client for the period of six months.
 - No significant difference for the cost of family care for the period of 6 months.
 - The costs of household aid and meals-on-wheels were not significantly different in the period of 6 months.
- k) The net cost for all stakeholders** was not significantly different between the intervention group and the control group.
- l) There was no difference on the average days at home in the period of 6 months, even when adjusting for the socio-economic status and the number of days alive.**

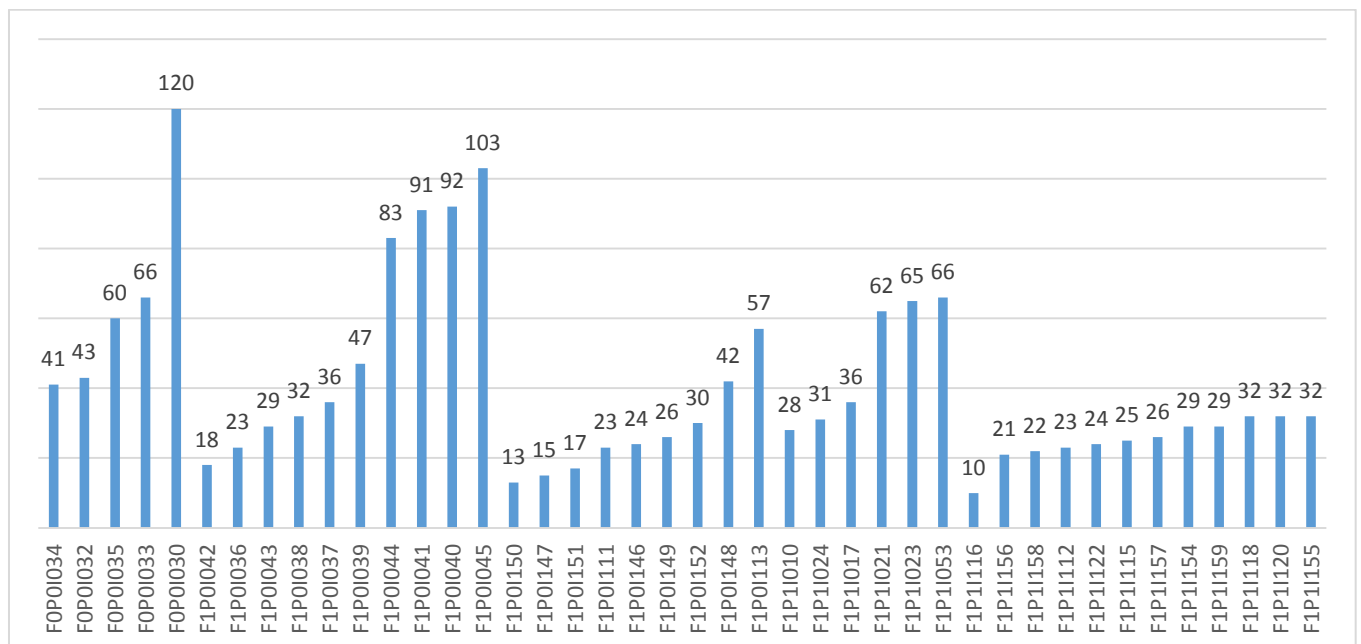
Chapter 4. Results of case management interventions

1. Cost of the interventions

The number of clients per FTE remained globally heterogeneous within the type of case management:

- For the F0, the number of clients varies from 41 to 120 per FTE.
- For the projects of case management and low intensity, from 18 to 103
- For the projects of case management low intensity with psychological support, from 28 to 66.
- For the projects of case management and high intensity (without psychological support), from 13 to 57
- For the case management, high intensity with psychological support, from 10 to 32. The discrepancy between projects was the lowest in this intervention.

Figure 14 Number of clients per FTE (health care professionals) for the year under consideration for case management interventions



The resources used not funded by the NIHDI represent in average 14.7% of the average cost for the NIHDI.

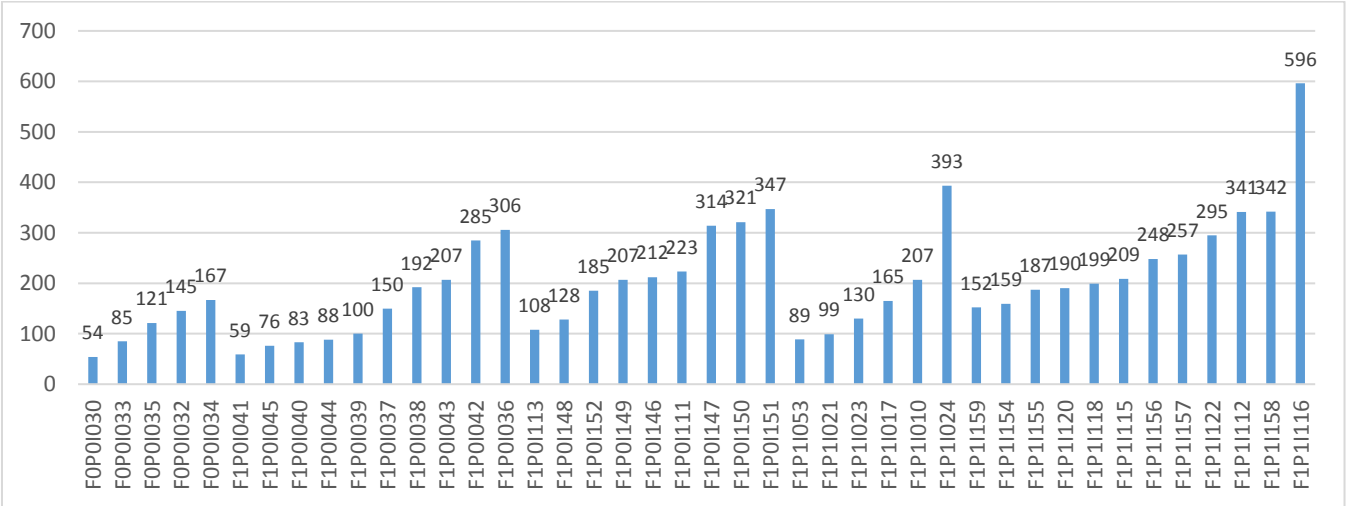
As for the number of clients, the average cost per client remained globally heterogeneous within the type of case management:

- For the F0, the number of clients varies from 54 to 167 per FTE.
- For the projects of case management and low intensity, from 59 to 306
- For the projects of case management low intensity with psychological support, from 108 to 347.

Chapter 4 Results of case management interventions
 1 Cost of the interventions

- For the projects of case management and high intensity (without psychological support), from 89 to 393
- For the case management, high intensity with psychological support, from 152 to 596.

Figure 15 Average cost per client per month for the NIHD for case management interventions



2. Results of the effectiveness and the costs: Intervention without proper case management, without psychological support FOP0

2.1. Description of the target population

2.1.1. Disability profiles

Description of disability profiles

The beneficiaries of interventions without proper case management, without psychological support were clustered in five disability profiles:

- **Clients with low limitations:** low functional and cognitive impairments but 24% of this group had a score on the DRS scales above the cut-off. These clients suffered from significant depressive symptoms.
- **Clients with IADL difficulties and initial cognitive impairments:** 89% of this group had a score of IADL scale above the IADL cut-off which means important difficulties on IADL tasks. Only 9% of this group had a score on CPS scale above the CPS cut-off which means important cognitive impairment. However, at least a quarter of this group presented initial cognitive impairments with a CPS score of 1 or 2 on a 6-point scale.
- **Clients with functional limitations:** 99% and 88% of this group had respectively a score of IADL and ADL scales above the cut-off of these scales. This means that these clients had significant functional limitations. The cognitive impairment was limited in this group with 75% of the clients with a score of 0 on the CPS scales and any CPS score above the CPS cut-off.
- **Clients with functional and cognitive impairments :** the clients in this group combined functional (with respectively 99% and 88% of the clients with a score on the IADL and ADL scales above the cut-off of these scales) , cognitive impairments (98% of the clients with a score on the CPS scale above the cut-off of this scale)
- **Clients with functional and cognitive impairments and in addition behavioral problems:** : the clients in this group combined functional (with respectively 92% and 75% of the clients with a score on the IADL and ADL scales above the cut-off of these scales) , cognitive impairments (83% of the clients with a score on the CPS scale above the cut-off of this scale) , behavioral problems (100% of the clients had at least one behavioral problem), and depressive symptoms (67% of clients had a DRS score above the cut-off).

Description of socio-demographic characteristics

The age and gender differences between the intervention group and the control group can be found in two clusters: IADL (cogn.) and the cluster of functional, cognitive and behavior problems. In these two groups, the control groups have a higher median for age and a higher proportion of women than the intervention group. In all clusters, the control group shows a higher percentage of clients in the high median income groups than the intervention group.

Chapter 4 Results of case management interventions

2 Results of the effectiveness and the costs: Intervention without proper case management, without psychological support FOP0

Table 7 Sociodemographic characteristics per disability profile for FOP0

	low limit.		IADL, (cogn.)		func.		func., cogn.		func., cogn., behav.	
	T	C	T	C	T	C	T	C	T	C
Age										
Median[IQR]	80[73-85]	81[79-86]	82[78-86]	80[68-84]	83[77-87]	82[78-86]	81[76-86]	82[78-87]	82[78-87]	81[72-88]
Gender										
% Men	29.55	16.29	26.03	27.85	27.98	27.98	40.74	24.69	41.67	41.67
% Women	70.45	83.71	73.97	72.15	72.02	72.02	59.26	75.31	58.33	58.33
ICG										
% No ICG	46.59	46.97	30.59	30.59	21.81	21.81	0	0	0	0
% No cohabitant	45.83	44.7	57.08	57.08	54.73	54.73	48.15	48.15	37.5	37.5
% Cohabitant	7.58	8.33	12.33	12.33	23.46	23.46	51.85	51.85	62.5	62.5
Region										
Bruxelles	25.38	0	15.53	0	8.64	0	7.41	0	4.17	0
Flandre	74.62	43.56	84.47	40.18	90.95	84.77	92.59	80.25	95.83	25
Wallonie	0	56.44	0	59.82	0.41	15.23	0	19.75	0	75
Median income										
Low	24.62	20.83	15.07	41.55	9.47	11.93	8.64	6.17	8.33	50
Medium	72.73	57.95	80.82	40.18	87.24	51.44	86.42	49.38	91.67	33.33
High	2.65	21.21	4.11	18.26	3.29	36.63	4.94	44.44	0	16.67
N										
Unique value	264	52	219	89	243	125	81	57	24	13

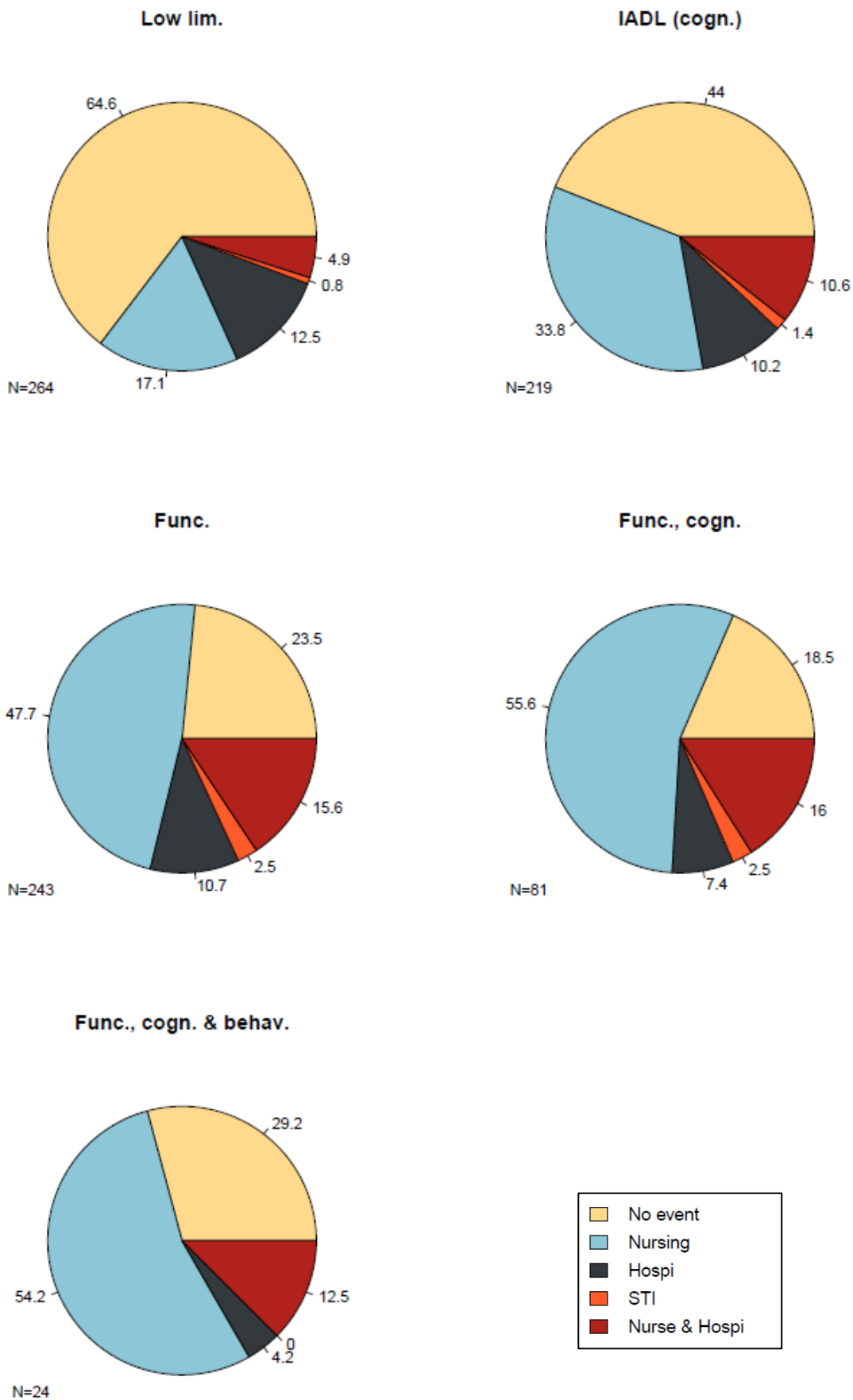
The figure hereafter presents the key previous healthcare utilization pattern of population grouped by disability profiles. Following characteristics may be highlighted:

- The proportion of use of nursing care seems increase with the increase of the dependency
- The proportion of short-term institutionalization was low at the inclusion in this interventions.
- The proportion of clients hospitalized in the two months before the inclusion is significant ranging from 16.7% of the clients with functional, cognitive and behavioral troubles to 26.3% of the clients with functional limitations.

Chapter 4 Results of case management interventions

2 Results of the effectiveness and the costs: Intervention without proper case management, without psychological support FOP0

Figure 16 Description of the historic health care consumption profile per disability profile for FOP0



2.1.2. Historic health care consumption profiles

Description of historic health care consumption profiles

The beneficiaries of interventions without proper case management, without psychological support were grouped in five historic health care consumption profiles:

- Clients without specific health care consumption before the inclusion in the intervention
- Clients with (hygiene) nursing care (for at least 3 months in the year before the inclusion, at least 2 times per week)
- Clients with recent hospitalization (hospitalization for more than one day in the two months before inclusion)
- Clients with short term institutionalization in the year before inclusion
- Clients with recent hospitalization and (hygiene) nursing care

Description of socio-demographic characteristics before inclusion

There are no differences for the age but there are significant differences for the gender distribution and median income before inclusion. The proportion of the people with high median income of in the control group IMA is significantly higher than this proportion in the intervention group while the proportion with medium income is higher in the intervention group.

Table 8 Sociodemographic characteristics per historic health care consumption profiles for FOP0

	No event		Nursing		Hospi		STI		Nursing, hospi	
	T	C	T	C	T	C	T	C	T	C
Age										
Median[IQR]	80[74-86]	80[74-84]	82[76-86]	82[76-87]	82[76-87]	80[74-85]	83[80-88]	86[81-89]	85[81-88]	85[80-88]
Gender										
% Men	30.79	45.12	32.42	32.42	31.03	44.83	10	0	21.7	43.4
% Women	69.21	54.88	67.58	67.58	68.97	55.17	90	100	78.3	56.6
ICG										
% No ICG	41.77	-	22.53	-	32.18	-	10	-	14.15	-
% No cohabitant	41.46	-	47.78	-	59.77	-	80	-	62.26	-
% Cohabitant	16.77	-	29.69	-	8.05	-	10	-	23.58	-
Region										
Bruxelles	36.89	9.76	14.33	4.44	17.24	9.2	10	20	4.72	10.38
Flandre	63.11	60.06	85.67	64.16	82.76	57.47	90	40	95.28	64.15
Wallonie	0	30.18	0	31.4	0	33.33	0	40	0	25.47
Median income										
Low	34.45	25.91	14.33	20.14	16.09	31.03	10	60	4.72	30.19
Medium	61.59	47.56	80.2	51.88	81.61	49.43	90	30	91.51	53.77
High	3.96	26.52	5.46	27.99	2.3	19.54	0	10	3.77	16.04
N										
Unique value	328	310	293	236	87	78	10	10	106	73

The figure hereafter presents the key previous disability profile of population grouped by historic health care consumption profiles. Following characteristics may be highlighted:

- A limited proportion of unmet needs (clients with significant functional limitations who don't benefit of nursing care) in nursing care can be observed in the group "no event" and hospitalization.
- The nursing care was for the majority provided to clients with functional limitations or combining functional and cognitive impairments.
- The short term institutionalization was used mainly by clients with functional limitations or clients combining functional and cognitive impairments. The short term institutionalization was justified for these clients after a hospitalization or as a respite period for the informal caregivers.

Chapter 4 Results of case management interventions

2 Results of the effectiveness and the costs: Intervention without proper case management, without psychological support FOP0

Figure 17 Description of the disability profiles per historic health care consumption profile for FOP0



2.2. Results for the disability profiles

2.2.1. Low limitations

- a) **Limited decrease of the functional limitations.** The results show a limited significant decrease of IADL score for about 20% of the clients with IADL score lower than 6 and an increase in ADL impairment for about 5% of the clients. No difference was found for the risk of falls. Since in this cluster only a low percentage of clients have IADL and or ADL impairment, an improvement was not really expected.
- b) **Improvement of quality of life and decrease of depressive symptoms.** About 40% of the clients in the intervention group show a limited but significant improvement on their quality of life. This improvement is also seen in the depression scale scores.
- c) **Increase of the burden.** The burden of informal caregivers (co-habitant or not) is higher in the intervention group for the informal caregivers at the highest levels of burden for this cluster (around 15 in the Zarit scale).
- d) **The proportion of use of nursing care is smaller in the intervention group.** Case management FOP010 is associated with a lower proportion of nursing care. This is a positive result since clients in this cluster have a very low level of impairment in ADL. Only 13.7% of the intervention group with no limitations for performing hygiene tasks or with no incontinence receive nursing care during the first six months, and the proportion of unmet needs is 10.6%.
- e) **A decrease of the proportion of use and the frequency of emergency visits.**
- f) **An increase in the frequency of GP out-of-hours visits.** A small proportion of clients in the intervention group shows a higher frequency of visits to the GP out-of-hours (10%).
- g) **No difference was found for hospitalization rates, institutionalization or death.**
- h) **The costs for the NIHDI**
 - The estimated intervention cost was 98.5 euro in average per month per client.
 - The average cost of nursing care per month per client was lower in the intervention group in the period of 6 months (average of 114 euro per client per month versus 538 euro in the control group). However these costs were also lower for the intervention group at baseline (57 versus 276 in the control group).
 - The cost paid for GP and specialist consultation was lower in the period of 6 months for almost 60% of the clients in the intervention group but the difference was small (lower than 25 euro per month per client).
 - The cost of hospitalization was lower in the intervention group for 10% of the clients.
 - Concerning the costs at home, the costs were lower in the intervention group and the difference was of 125 euro per month per client.
 - When including the costs of home care, hospitalization and intervention costs, the total costs for the NIHDI was not different between the two groups.
- i) **The costs for regions:**
 - The cost of daycare was not different between the two groups.
 - The cost of temporary institutionalization is higher in the intervention group (13 euro per month per client).

- The cost of definitive institutionalizations was not significantly different between the intervention group and the control group. This cost was 21 euro in intervention group in the period of 6 months (24 euro in the control group).
- j) The costs for clients and informal carers**
- For reimbursed health care services and nursing home, there were no significant differences between the intervention and the control group.
 - There were no significant differences for the cost of day or the cost of temporary institutionalizations (12 euro) in the period of 6 months.
 - No significant difference for the costs of definitive institutionalization. The average cost was 18 euro per client per month.
 - The cost of family care was significantly higher in the intervention group for the period of 6 months but it also started at a higher level.
 - No significant differences for the cost of household aid.
 - The cost of meals-on-wheels increased in the intervention group and decreased in the control group.
- k) For all stakeholders, the average total cost were not significantly different.**
- l) There was no significant difference in the average days at home, even when adjusting for the socio-economic status and the number of days alive.**

2.2.2. IADL impairment (with or without some cognitive problems)

- a) Limited improvement on the functional limitations.** The IADL performance was increased for almost 30% of the clients with IADL score below 24 in this cluster. The increase was up to 9 points in a scale of 48. However, for ADL there is a worsening of the functional performance for 20% of the clients with ADL around the value of 2 at the second evaluation. This increase in ADL scores is significant but limited to 1 in a scale of 6. No difference was observed for the risk of falls.
- b) Significant improvement of the burden of the non-cohabitant ICG.** A trend of decrease in burden was observed for the informal caregivers who do not live with the frail older person. This decrease is significant for 10% of the clients in this cluster who have very high Zarit scores (above 20) and up to 6 points on a scale of 48. A trend of increase can be observed for cohabitants and this increase is significant for 20% of the informal caregivers who have very high burden (above 20). In this case the burden worsened up to 10 points on a scale of 48.
- c) The quality of life is slightly improved.** Case management FOP0IO was associated with an improvement of the quality of life in this cluster for almost 80% of the clients. This improvement is rather limited to 2 points on the WHOQOL scale.
- d) No difference on the depression scores.**
- e) The proportion of use of nursing care is lower the intervention group.** The unmet need was about 35% of the intervention group and 14% of the control at the inclusion and decreased to respectively 20% and 1% during the period of six months after the inclusion. The proportion of nursing care for clients with no hygiene tasks and incontinence limitations was about 6% in the intervention group and about 10% in the control group.

- f) No significant difference was observed in the proportion of use of emergency services.** However, the users in the intervention group visit up to 2 times less the emergency department. This decrease of the frequency of emergency visits is not significant.
- g) No significant difference was observed on the proportion of visits to GP out-of-hours** and a trend to decrease the frequency of visits to the GP out-of-hours is observed among the clients in the intervention group.
- h) The proportion and frequency of hospitalization is significantly higher in the intervention group.** This increase is not a bad result because a decrease of emergency visits is observed. So, these are planned hospitalization.
- i) No difference was found for the risk of death, nor for the institutionalization.**
- j) The costs for the NIHDI**
- The estimated intervention cost was 92 euro per months per client.
 - The average cost of nursing care was significantly different after six months between treated and control. The costs were lower in the intervention group (178 euro versus 1181 euro in the control group). However, the nursing cost was already significantly lower in the intervention group at baseline. The nursing cost is significantly lower for 70% of the intervention group.
 - The cost paid for GP and specialist consultations was 90% lower in the intervention group.
 - The cost of hospitalization was higher in the intervention group for almost 10% of the clients.
 - The costs incurred at home were lower in the intervention group than in the control group (401 euro less per client per month).
 - When the costs of hospitalizations and intervention are added to the costs incurred at home, the costs in the 6 months are even lower in the intervention group (494 euro). After adjusting for socio-economic status and days alive, the average costs remain lower in the intervention group for 80% of the clients.
- k) For the regions**
- The cost of day care is significantly lower in the intervention group than in the control group (0 Euro versus 38 Euro in the control group).
 - No significant difference for the cost of temporary institutionalizations (38 euro per month per client).
 - No significant difference for the cost of definitive institutionalization. The average cost was 78 euro per month per client for the period of six months.
- l) For the clients and informal carers**
- For reimbursed health care services and nursing home, there were no significant differences between the intervention and the control group.
 - The costs of day care were significantly lower in the intervention group.
 - No significant difference for the cost of temporary institutionalizations (29 euro per month per client in the intervention group).
 - No significant difference for the cost of definitive institutionalization. The average cost was 76 euro per month per client for the period of six months.
 - No significant difference for the cost of family care for the period of 6 months.
 - The cost of household aid was significantly lower in the intervention group (372 versus 575 euro per month in the control group).

- The costs of meals-on-wheels were significantly higher in the intervention group in the period of 6 months (56 Euro versus 28 Euro in the control group).
- m) For all stakeholders, the costs were significantly lower in the intervention group in the period of 6 months (average of 595 euro less per client per month). The costs were lower for 80% of the clients.
- n) For the period of 6 months, there was no difference on the average days at home, even when adjusting for the socio-economic status and the number of days alive.

2.2.3. Functional (IADL & ADL impairment)

- a) **There is a significant and large improvement in IADL performance** for 20 % of the clients with IADL scores below 30. This improvement is of maximum 20 points on a scale of 48. For 20% of clients with very high IADL needs (score above 39), only IADL worsening is perceived. We observe a slight decrease in ADL impairment of 1 point in a scale of 6 for almost 25% of the clients for ADL scores lower than 3. A significant decrease was found for the risk of falls.
- b) **A slight increase on informal caregiver's burden for co-habitants.** This was observed for 15% of the informal caregivers with very high burden (above 22 in the Zarit scale). No difference for non co-habitants.
- c) **An improvement for the perceived quality of life.** About 80% of the frail older people receiving case management FOP0 show an improvement on their WHOQOL scores up to 5 points in a scale of 66.
- d) **No difference on depressive symptoms.**
- e) **The proportion of nursing care is significantly lower in the intervention group.** In the control group almost all clients with significant hygiene tasks limitations or with in addition incontinence problems receive nursing care. However, in the intervention group, 32% of the clients with hygiene tasks limitations and 17% of the clients with hygiene tasks limitations and incontinence problems do not receive nursing care, which represents almost 21% of the total intervention group at the second evaluation. These clients remain with unmet needs. However, at the inclusion in the project 40% of the total intervention group had unmet needs of nursing care. The intervention reduced this proportion. In the control group only 6% of the total group had unmet needs at the inclusion but this low percentage may be due to the selection of the control group which was among nursing care organizations.
- f) **A significant increase in the use of day care services.** The short term institutionalization may be used for this target population in the follow-up of hospitalization.
- g) **A significant decrease of the frequency of emergency visits.**
- h) **A significant increase of the proportion and the frequency of hospitalization.** This can be a good indication of an association of the intervention on increasing planned visits to the hospital instead of emergency visits.
- i) **No other difference was found for this intervention on the visits to the GP out-of-hours or death.**
- j) **Intervention is associated with higher risk of institutionalization.** Clients with mainly functional difficulty may not be go to definitive institution. The intervention was probably not enough intensive and integrated to respond to specific needs of this population.
- k) **The costs for the NIHDI**
 - The estimated intervention cost was 77.3 euro per months per client.

- The average cost of nursing care per month per client was lower in the intervention group in the period of 6 months (average of 378 euro per client per month versus 1167 euro in the control group). However these costs were also lower for the intervention group at baseline. The difference between the intervention and the control groups was significantly higher than before intervention. After adjusting for socio-economic status and days alive, these costs were lower for all the clients in the intervention group in the period of 6 months.
- The cost paid for GP and specialist consultations was lower in the intervention group for almost 80% of the clients. This difference was of less than 30 euro per month per client.
- The cost of hospitalization was higher in the intervention group in the period of 6 months for 60% of the clients.
- The costs incurred at home (NIHDI) were lower in the intervention group (360 euro less).
- When we included the costs of hospitalization and the cost of the intervention, the costs in the 6 months period, there was no significant difference anymore.

l) The costs for the regions

- There was no difference in the cost of day care for the period of 6 months.
- The cost of temporary institutionalizations in the period of 6 months was higher in the intervention group (average of 70 euro per month per client versus 19 Euro in the control group).
- The cost of definitive institutionalizations was higher in the intervention group. The average cost was 98 euro for six months after intervention (versus 30 euro in the control group).

m) For the clients and informal carers:

- For reimbursed health care services and nursing home, the costs were significantly higher in the intervention group for almost 30% of the clients.
- No significant difference for the cost of day care.
- No significant difference for the cost of temporary institutionalizations for six months after the intervention
- The cost of definitive institutionalization was higher in the intervention group than in the control group. The average cost was 77 euro per month per client for the period of six months (26 euro in the control group).
- No significant difference for the cost of family care for the period of 6 months.
- The costs of household aid were not significantly different in the period of 6 months.
- The cost of meals-on-wheels was not significantly different in the period of 6 months but it increased in the intervention group while it was stable in the control group.

n) The net cost for all stakeholders was not significantly different between the two groups for the period of 6 months.

o) The clients in the intervention group spent less days at home than the clients in the control group. When adjusting for the socio-economic status and the number of days alive, there were less days at home for 40% of the intervention group.

2.2.4. Functional and cognitive problems (ADL, CPS)

- a) **Slight improvement of functional limitation for clients with high level of limitations.** The only difference found was for about 15% of the clients who have IADL scores lower than 37. These clients show a slight improvement in IADL (5 points on a scale of 48). No significant difference was found for ADL, falls.
- b) **Worsening of quality of life and burden.** For about 20% of the co-habitants, there is an increase in burden of up to 6 points in a scale of 48. This is the case when the burden is high (above 21). In addition, the intervention is associated with a limited worsening in the perceived quality of life for 10% of the clients with a 2 point difference in a scale of 66 for people with WHOQOL score above 37.
- c) **No significant difference was shown for depression**
- d) **A significant increase in the use of day care services.** This is a positive result because day care centers are recommended for people with cognitive impairment and can also be considered as a form of respite for the informal caregiver.
- e) **A lower proportion of use of nursing care in the intervention group.** The needs for nursing care stay uncovered for 32% of clients with ADL limitation and 17% of clients with ADL and incontinence problems in the intervention group (21% of the total intervention group) while almost all needs are covered in the control group (selection). However, at the inclusion, 34% of the intervention group had unmet need of nursing care for only 10% of the control group. This decrease in unmet needs (13% in the intervention group) shows that the project target the clients who needed nursing services, but there is room for improvement.
- f) **No significant difference was shown on the proportion of emergency visits.** However, the frequency of emergency visits is lower among the users of emergency services.
- g) **The frequency and proportion of hospitalizations is higher.**
- h) **No difference was found on the visits to the GP out-of-hours or death.**
- i) **The risk of institutionalization is higher in the intervention group than in the control group.** The high level of dependency of this group can justify the definitive institutionalization.
- j) **The cost for the NIHDI**
 - The estimated intervention cost was 88.2 euro per months per client.
 - The average cost of nursing care per month per client was significantly lower in the intervention group in the period of 6 months (average of 701 euro per client per month versus 1789 euro in the control group). After adjusting for socio-economic status and days alive, these costs were lower for 95% of the clients in the intervention group in the period of 6 months.
 - The cost paid for GP and specialist consultations was lower in the intervention group for almost 70% of the clients. This difference was of less than 30 euro per month per client.
 - The cost of hospitalizations was higher in the intervention group in the period of 6 months for almost 20% of the clients.
 - The costs incurred at home (NIHDI) were lower in the intervention group (548 euro less).
 - When we also included the costs of hospitalization and the cost of the intervention (by including also behavioral problems), the costs in the 6 months period were still lower in the intervention group (421 euro less). The average costs are lower for about 30% of the clients in the intervention group.
- k) **For the regions**

- The cost of day care was significantly higher in the intervention group (49 versus 7 euro in the control group).
- The cost of temporary institutionalizations was significantly higher in the intervention group in the period of 6 months (average of 79 euro per month per client versus 15 Euro in the control group).
- The cost of definitive institutionalizations was higher in the intervention group. The average cost was 113 euro for six months after intervention (versus 32 Euro in the control group).

l) For the clients and informal carers

- For reimbursed health care services and nursing home, the costs were significantly higher in the intervention group for almost 35% of the clients.
- The cost of day care was significantly higher in the intervention group (15 versus 2 euro in the control group).
- The cost of temporary institutionalizations was significantly higher in the intervention group in the period of 6 months (average of 66 euro per month per client versus 22 Euro in the control group).
- The cost of definitive institutionalizations was higher in the intervention group. The average cost was 87 euro per month per client for the period of six months versus 30 Euro in the control group.
- The cost of family care was not different between the two groups.
- The costs of household aid were not significantly different in the period of 6 months.
- The cost of meals-on-wheels was significantly higher in the intervention group for the period of 6 months (60 versus 17 euro in the control group).

m) The net cost for all stakeholders was not significantly different in the period of 6 months. After adjusting for socio-economic status and days alive, 25% of the clients in the intervention group had lower costs than the control group.

n) There was no significant difference in the average of days at home. When adjusting for the socio-economic status and the number of days alive, there were less days at home for 25% of the intervention group.

2.2.5. Functional and cognitive problems (ADL, CPS and also behavior group)

The group functional, cognitive and behavioral problems consists of only 26 clients in this type of intervention. Some statistical analysis are difficult to interpret with this small number of clients.

- a) No difference was observed on the IADL, falls, depression, quality of life or informal caregiver's burden.**
- b) For clients with high ADL score (almost 4), a slight increase** in impairment of less than 1 point in a scale of 6 can be observed for almost 10% of the clients. However, a **decrease of proportion of clients above the cut-off** of 3 can be seen as a positive significant result.
- c) Less nursing proportion after inclusion. After the intervention, some unmet needs of nursing care remain.** There were important unmet needs at the inclusion in the intervention group (50% of clients with ADL limitations and 10% of clients with ADL and incontinence problems. This corresponds to a total of 23% of the clients in the intervention group with unmet needs.

In the control group, 33% of clients with ADL limitations and 64% of clients with ADL and incontinence problems had unmet needs at inclusion (a total of 45% of control group). At the second evaluation, the unmet needs were almost totally covered in the control group (selection) but in the intervention group these unmet needs remained uncovered for 27% of the intervention group.

d) The frequency of hospitalizations is slightly higher in the intervention group.

e) No significant differences were observed on the emergency and the GP out-of-hours visits.

f) No significant difference was shown on the risk of institutionalization or death.

g) The costs for the NIHDI

- The estimated intervention cost was 92.5 euro per months per client.
- The average cost of nursing care per month per client was lower in the intervention group in the period of 6 months (average of 286 euro per client per month versus 1602 euro in the control group). Although these costs were also lower for the intervention group at baseline; they increased significantly more in the control group. After adjusting for socio-economic status and days alive, these costs were lower for 50% of the clients in the intervention group in the period of 6 months.
- The cost paid for GP and specialist consultations was lower in the intervention group for all clients. This difference was of less than 90 euro per month per client.
- The cost of hospitalizations was higher in the intervention group in the period of 6 months for 20% of the clients.
- The costs incurred at home were significantly lower in the intervention group (548 euro less).
- When we included the costs of hospitalization and the cost of the intervention, the costs in the 6 months period were still significantly lower in the intervention group (421 euro less). After adjusting for socio-economic status and days alive, the average costs are lower for about 40% of the clients in the intervention group.

h) For the regions

- There was no difference in the cost of day care for the period of 6 months. The cost was on average 54 euro per client per month.
- No significant difference for the cost of temporary institutionalizations in the period of 6 months (average of 78 euro per month per client).
- The cost of definitive institutionalizations was higher in the intervention group. The average cost was 200 euro per client per month for the six months after intervention (versus 4 Euro in the control group).

i) For the clients and informal carers

- For reimbursed health care services and nursing home, the costs were significantly higher in the intervention group compared to the control group for 25% of clients
- No significant difference for the cost of day care.
- No significant difference for the cost of temporary institutionalizations for six months after the intervention.
- The cost of definitive institutionalization was higher in the intervention group. The average cost was 130 euro per month per client for the period of six months versus 4 Euro in the control group).
- No significant difference for the cost of family care for the period of 6 months.

- The costs of household aid were not significantly different in the period of 6 months.
 - The costs of meals-on-wheels were not significantly different in the period of 6 months but it increased in the intervention group while it was stable in the control group.
- j) The net cost for all stakeholders was not significantly different in the period of 6 months. After adjusting for socio-economic status and days alive, about 20% of the clients in the intervention group had lower costs than the control group.
- k) When adjusting for the socio-economic status and the number of days alive, there were less days at home for 25% of the intervention group.

2.3. Results for the historic health care consumption profiles

2.3.1. No event

- a) **The proportion of clients receiving nursing care is significantly higher in the intervention group** for the period of six and twelve months after inclusion. The proportion of clients in the intervention group with unmet needs at inclusion represented almost 40% of the total clients in the intervention group. This proportion decreased to 15% of the total intervention group during the period of six months after inclusion. The increase in the proportion of nursing care can be justified by meeting the needs of the clients with hygiene tasks difficulties combined or not with incontinence problems. This is a positive result of the intervention. Only 7% of the nursing care were provided to clients without hygiene tasks and incontinence problems.
- b) **No difference in the proportion of short term institutionalization.** This is consistent with the profile of clients because the proportion of clients with severe functional or cognitive impairment is low (17% to 23%).
- c) **No significant difference in the proportion of day care center use.**
- d) **The proportion and the frequency of emergency visits is significantly lower in the intervention group for the period of one year after inclusion.** In the period of six months, no difference in proportion or frequency was found but a reduction was found during the period of 12 months. This is an indication of the long-term effect of the intervention on the emergency visits.
- e) **The risk of death was higher in the intervention group** during the periods of 12 months. Due to the difficulties of identifying a control with similar frailty level when no event was observed before the inclusion, it is plausible that the intervention group is frailer than the control group. This justifies the fact that the risk of death in the intervention group is higher than in the control group.
- f) **The proportion of hospitalization was significantly higher in the intervention group for the period of six months.** As the proportion of planned hospitalization was higher in the intervention group at six months and the proportion of emergency visits was lower at one year, the intervention appears to have an effect at stabilizing the situation of the clients and fostering planned hospitalizations. In addition, the higher proportion of hospitalization can be explained by the level of frailty of the intervention group, which is possibly higher. This also justified the higher risk of death in the intervention group.

- g) **The proportion of institutionalization is higher in the intervention group** during the period of six and twelve months. 68% of the institutionalized clients had low limitation, IADL and initial cognitive problems or mainly functional limitations and were not be expected to be institutionalized.
- h) **The costs for the NIHDI**
- The estimated intervention cost was 100.8 euro in average per month per client.
 - The average cost of nursing care per month per client increased more in the intervention group than in the control group (from 2 to 98 euro). At baseline, the costs were slightly lower in the intervention group. An increase was expected since these clients had no nursing before the start in the project. The level of nursing costs at 6 months was significantly higher in the intervention group than in the control group (for almost 40% of the clients). In the period of 12 months, these costs did not increase significantly (the average was 134 at 12 months) and the same difference was observed as for six months between the two groups.
 - The cost of GP and specialist consultations was higher in the intervention group than in the control group in 6 months. This was observed for 30% of the clients. In the period of 12 months the costs in the intervention group were higher for 25% of the clients with high medical cost and the costs were lower than the control group for 40% of the people with the lowest costs.
 - The cost of hospitalizations were higher for 25% of the clients in the intervention group in the period of 6 months. However, in the 12 months, the costs were lower in the intervention group for about 40% of the clients.
 - Concerning the costs at home, the total cost was higher in the intervention group (average of 125 euro more per month for 6 months and 128 at 12 months).
 - When including the costs of home care, hospitalization and intervention costs, the costs for the NIHDI were in average 946 euro per month higher in than in the control group (higher for 90% of clients). On the period of 12 months, these costs remained higher and were 681 euro per month more than in the control group. These costs were higher for 90% of the intervention group in 6 months and all clients in 12 months.
- i) **The costs for the regions:**
- No significant difference for the cost of day care.
 - The cost of temporary institutionalizations was not significantly higher in the intervention group in the period of 6 months but was significantly higher in period of 12 months. The average cost was 17 euro per client per month in the period of 6 months and 19 euros in the period of 12 months. The cost did not significantly change between 6 and 12 months.
 - The cost of definitive institutionalizations **was not different between the two groups** for six months. This was 37 euros per month per client in the intervention group in the period of 6 months. The cost was almost significantly higher in the intervention group for 12 months (80 euro in intervention group versus 42 euro in the control group at six months).
- j) **The costs for the clients**
- For reimbursed health care services and nursing home, the costs did not significantly differ in the 6 months but were higher in the intervention group for the 12 months period (for 15% of the clients).
 - No significant difference for the cost of day care.

- The cost of temporary institutionalizations did not significantly differ in the 6 and 12 months (average of 14 euro).
 - No significant difference for the cost of definitive institutionalizations. The average cost was 34 euro per client per month.
- k) **For all stakeholders**, the net cost was significantly higher in the intervention group: + 948 euro at 6 months and + 890 at 12 months compared to the control group. These costs are higher for 90% of the clients in the 6 months and all clients in 12 months.
- l) For the periods of 6 and 12 months, the average days at home was lower before and after intervention in the intervention group: no change was observed after implementing the intervention. The average was 141 for the intervention group and 173 for the control group. When adjusting for the socio-economic status and the number of days alive, 30% clients in the intervention spent less days at home for 6 and 12 months.

2.3.2. Nursing

- a) **No change in the proportion of nursing care in the intervention group.** The proportion of unjustified use of nursing care (nursing care offered to clients without problems with hygiene tasks and incontinence) is low (7.5% of the total intervention group). During the period of six months after inclusion, only 17% of the clients with difficulties in performing hygiene tasks and 14% of the clients with hygiene tasks and incontinence problems stopped the use of nursing care. This difference was not significant.
- b) **No significant change in the proportion of short-term institutionalization** during the period of six and twelve months after inclusion.
- c) **The proportion of use of day-care centers was significantly higher in the intervention group during the period of 6 months and one year after inclusion.** This can be a positive result since 30% of the clients in this cluster have moderate to severe cognitive impairment.
- d) **The proportion of emergency visits was significantly lower in the intervention group during the period of one year after inclusion.** The proportion of clients using emergency department during the first year after inclusion was lower in the intervention group than in the control group and this may be a positive result toward planning of hospitalizations.
- e) **The risk of death is significantly higher in the intervention group at 6 months.** The intervention group may be frailer than the control group.
- f) **Higher proportion and frequency of GP-out-of-hours visits in the intervention group** during the periods of 12 months. This is a negative outcome associated with this intervention.
- g) **The proportion of hospitalization is higher in the intervention group during the period of 6 and 12 months and the frequency is higher at 6 months.** This may be explained by the possibly higher level of frailty of the intervention group (higher risk of death in the intervention group). The intervention seems to have a positive association towards planned hospitalizations. During the first six months, clients in the intervention group are more frequently hospitalized but this situation is stabilized at 12 months.
- h) **The risk of institutionalization was higher in the intervention group.** 16% of the institutionalized clients had low limitations or IADL and initial cognitive problems and 44% had mainly functional limitations. These clients should be maintained at home. The intervention were probably not enough integrated and not enough intensive for this population.

i) The costs for the NIHDI

- The estimated intervention cost was 91 euro per months per client.
- The average cost of nursing care was not significantly different after six months between treated and control. At 12 months, the level was lower for 50% of the clients in the intervention group. The cost at 6 months was 391 euros in the intervention group and 413 euros in the control group in the period of 6 months.
- The cost paid for GP and specialist consultations was significantly higher for 30% of clients in the intervention group than in the control group for 6 months and lower for 80% in the period of 12 months. There were also for this period 15% clients with higher costs in the intervention group than the control group.
- The cost of hospitalizations was higher in the intervention group. This was observed for 50% of the intervention group in the 6 months but in the 12 months period there was no significant difference.
- The total cost at home, hospitalizations and intervention was significantly higher in the intervention group (835 euro more in 6 months and 777 higher in 12 months. The costs were higher for almost all clients in the 6 months and for 80% of the clients in the 12 months.

j) The costs for the regions

- The cost of temporary institutionalizations was not significantly higher for 6 months (47 vs 32 euro).
- The cost of definitive institutionalizations was significantly higher in the intervention group for 6 (86 vs 32) and 12 months.

k) The costs for the clients

- For reimbursed health care services and nursing home, the costs were higher in the intervention group at 6 months (for 10% of clients) and 12 months.
- The cost of temporary institutionalizations was not significantly different in the period of 6 and 12 months. The average cost was 38 euro per month per client for six months after intervention.
- The cost of definitive institutionalizations was significantly higher in the intervention group at 6 and 12 months. The average cost was 69 euro per month per client for six months after intervention versus 30 euro.

l) For all stakeholders, the net cost is significantly higher in the intervention group: + 1081 euro at 6 months compared to the control group and +1196 for 12 months. These costs are significantly higher for all clients in 6 months and almost all clients in 12 months.

m) For the period of 12 months, the average days at home was lower for the intervention group. When adjusting for the socio-economic status and the number of days alive, the average days at home was lower in the intervention group than in the control group for 6 (for 50% of clients) and 12 months for 90% of the clients. The average was 143 the intervention group and 165 for the control group.

2.3.3. Hospitalization

- a) **The proportion of clients who receive nursing care was higher in the intervention group than in the control group during the 6 and 12 months after inclusion.** Before the intervention, there were 59% of the unmet needs. These unmet needs 25% of the intervention group during the first 6 months and the use of unjustified nursing care is only for 8.6% of the clients.
 - b) **No change in the proportion of short-term institutionalization and on the use of day care centers.**
 - c) **The proportion and frequency of emergency visits was lower in the intervention group at 12 months and the frequency of GP out-of-hours visits was slightly lower at 6 months.**
 - d) **No difference was observed on the risk of death.** The level of frailty seem to be similar between intervention and control group.
 - e) **The frequency of hospitalization is higher in the intervention group during the period of 12.**
 - f) **No significant difference for the risk of institutionalization and the risk of death.** This type of intervention does not seem to be effective at keeping frail older people longer at home.
- a) The cost for the NIHDI**
- The estimated intervention cost was 86.8 euro per months per client.
 - The average cost of nursing care significantly increased in the intervention group for six months control group at 6 months (160 euro in the intervention group versus 69 euro per client per month in the control group). It remained stable between 6 and 12 months in the two groups. In the 12 months, both groups started at the same level at baseline, but the cost was higher after 12 months for the intervention group. At 6 months the costs are higher for 40% of the clients and at 12 months there were almost no significant differences anymore.
 - The cost of hospitalizations was significantly higher in the intervention group for six months after intervention for about 40% of clients. No difference was observed for 12 months.
 - The total net cost (including home, hospitalizations and intervention), the costs were higher in the intervention group (781 euro more at 6 months and 671 higher at 12 months). This was observed for about 50% of the clients in the 6 months period and 20% of the clients at 12 months (slight significant difference).
- b) The cost for the regions**
- The difference of costs of temporary institutionalizations was not significant for the period of 6 or 12 months. The average cost per client observed for six months in the intervention group is 30 Euro per month.
 - The cost of definitive institutionalizations was not significantly different in the 6 and 12 months (average of 61 euro per month per client).
- c) The cost for clients**
- For reimbursed health care services and nursing home, there was no significant difference for the periods of 6 and 12 months.
 - The cost of temporary stays in nursing home was not different for six month but was significantly higher for twelve months in the intervention group.
 - The cost of definitive institutionalizations was not significantly lower in the intervention group for 6 and 12 months.

- d) **For all stakeholders, the net cost is higher in the intervention group (by including STI and Nursing, Hospi) :** +747 euro at 6 months and +777 euro at 12 months compared to the control group. In the group Hospi, these costs are higher for almost 40% in the 6 months and slightly higher for 20% of the clients in the 12 months period.
- e) **For the periods of 6 and 12 months, there was no difference for the average days at home.** When adjusting for the socio-economic status and the days alive, there was no difference.

2.3.4. Short term institutionalization

- a) **The unmet needs of nursing care seem to be covered in the intervention group.** The use of nursing care was justified in the intervention group by clients with hygiene tasks difficulties and/or incontinence. At inclusion 50% of the clients had unmet needs. Six months after inclusion this proportion was totally reduced.
- b) Due to the low number of clients in this cluster, **it was not possible to calculate the difference** in the following outcomes: use of day-care centers, use of short-term institutionalization, emergency visits, GP out-of-hours, hospitalization.
- c) **No difference was found on the risk of death and institutionalization.**
- f) **The costs for the NIHDI:**
 - The estimated intervention cost was 106.4 euro per months per client.
 - The average cost of nursing care increased significantly for 6 and 12 months in the intervention group and remained higher in the intervention group (642 euro in the intervention group versus 196 euro in the control group). The level of nursing costs in the intervention group was higher for 6 months for 15% of clients and for 12 months, for 70% of clients.
 - The cost paid for GP and specialist consultations was not different for six months and 12 months and was higher in the intervention group for 12 months (90% of the clients).
 - No difference for the cost of hospitalizations.
 - The costs incurred at home (NIHDI) were not significantly different in the period of 6 and 12 months.
- When we include the costs of hospitalization and intervention, the costs were higher in the intervention group (781 euro more at 6 months and 671 higher at 12 months).
- g) **The costs for the regions**
 - The cost of daycare was lower in the intervention group (0 vs 25 euro).
 - There was no significant difference for the costs of temporary institutionalizations in the period of 6 and 12 months.
 - The cost of definitive institutionalizations was significantly lower in the intervention group at 6 and 12 months. The average cost was 48 euro in the intervention group (457 euro in the control group).
- h) **The costs for clients**
 - For reimbursed health care services and nursing home, the costs are significantly lower in the intervention group in the 12 months for almost 15% of all clients.
 - The costs of temporary institutionalizations were not significantly different for the periods of 6 months and 12 months.

- The costs of definitive institutionalizations were significantly lower at 6 and 12 months (39 euro per month in the intervention group, versus 838 euro in the control group for six months).
- i) For all stakeholders, the net cost was higher in the intervention group (by including Hospi, and Nursing, hospi) : +747 euro at 6 months and +777 euro at 12 months compared to the control group.**
- The average cost of nursing care in the intervention group was lower for 6 months (294 euro per month per client versus 457 euro in the control group). This was the case for about 25% of the clients. In the 12 months the costs in the intervention group were not significantly different.
 - The cost paid for GP and specialist consultations was not significantly different between the two groups.
 - The cost of hospitalizations was significantly slightly lower in the intervention group for 12 months for about 30% of clients. No significant difference was observed for 6 months.
 - When we include at home, the costs of hospitalization and intervention (by also including Hospi or STI groups), the costs were higher in the intervention group (781 euro more at 6 months and 671 higher at 12 months). For this group (Nursing and Hospi only), the cost was lower for 40% of the clients in the 12 months. No difference was observed for 6 months.
- a) The costs for the regions:**
- The difference of costs of temporary institutionalizations was not significant for the period of 6 or 12 months. The average cost was 100 euro per month per client.
 - The cost of definitive institutionalizations was significantly higher in the intervention group for 12 months (280 versus 129 euro in the control group) but it was not significant in the period of 6 months.
- j) The costs for clients**
- Concerning the reimbursed health care services and nursing home, there was no significant difference in the 6 ad 12 months.
 - The costs of temporary institutionalizations were not significantly different for the period of 6 and 12 months (average of 81 euro per month per client).
 - The difference of costs of definitive institutionalizations was not significant for the period of 6 or 12 months. The average costs were 99 euro per month per client.
- k) For all stakeholders, the net cost is higher in the intervention group (by including Hospi, STI) : +747 euro at 6 months and +777 euro at 12 months compared to the control group. For the group Hospi and Nursing, these costs are higher for almost 20% of clients in the 6 months and 12 months.**
- o) For the periods of 6 and 12 months, the average days at home was lower for the intervention group in the 6 and 12 months with the average days of 126 for six months (146 in the control group). After adjusting for the socio-economic status and the number of days alive, no difference was observed between the two groups.**

3. Results of the effectiveness and the costs: Intervention with proper case management, without psychological support and with a low intensity

3.1. Description of the target population

3.1.1. Disability profiles

Description of disability profiles

The beneficiaries of interventions without proper case management, without psychological support were clustered in five disability profiles:

- **Clients with low limitations:** low functional and cognitive impairments but 24% of this group had a score on the DRS scales above the cut-off. These clients suffered from significant depressive symptoms.
- **Clients with IADL difficulties and initial cognitive impairments:** 93% of this group had a score of IADL scale above the IADL cut-off which means important difficulties on IADL tasks. Only 14% of this group had a score on CPS scale above the CPS cut-off which means important cognitive impairment. However, one half of this group presented initial cognitive impairments with a CPS score of 1 or 2 on a 6-point scale.
- **Clients with functional limitations:** 89% and 99% of this group had respectively a score of IADL and ADL scales above the cut-off of these scales. This means that these clients had significant functional limitations. The cognitive impairment was limited in this group with 75% of the clients with a score of 0 on the CPS scales and any CPS score above the CPS cut-off.
- **Clients with functional and cognitive impairments :** the clients in this group combined functional (with respectively 98% and 82% of the clients with a score on the IADL and ADL scales above the cut-off of these scales) , cognitive impairments (95% of the clients with a score on the CPS scale above the cut-off of this scale)
- **Clients with functional and cognitive impairments and in addition behavioral problems:** : the clients in this group combined functional (with respectively 91% and 69% of the clients with a score on the IADL and ADL scales above the cut-off of these scales) , cognitive impairments (87% of the clients with a score on the CPS scale above the cut-off of this scale) , behavioral problems (100% of the clients had at least one behavioral problem), and depressive symptoms (56% of clients had a DRS score above the cut-off).

Description of socio-demographic characteristics before inclusion

There are no significant differences for age and gender between the intervention group and the control group. However, in all clusters the control group shows a higher percentage of clients living in municipalities being part of the high median income groups.

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Table 9 Sociodemographic characteristics per disability profile for F1P0IO

	low limit.		IADL, (cogn.)		func.		func., cogn.		func., cogn., behav.	
	T	C	T	C	T	C	T	C	T	C
Age										
Median[IQR]	80[76-84]	81[76-86]	82[77-86]	82[78-87]	82[77-86]	83[78-87]	82[77-87]	82[78-87]	80[75-85]	82[70-87]
Gender										
% Men	35.31	23.73	26.32	27.96	31.01	25.72	37.26	34.98	38.75	42.5
% Women	64.69	76.27	73.68	72.04	68.99	74.28	62.74	65.02	61.25	57.5
ICG										
% No ICG	24.86	24.86	10.53	10.2	9.86	9.62	0.38	0	1.25	0
% No cohabitant	55.93	55.93	60.86	61.51	54.09	53.85	44.49	45.25	38.75	38.75
% Cohabitant	19.21	19.21	28.62	28.29	36.06	36.54	55.13	54.75	60	61.25
Region										
Bruxelles	0	0	0	0	0	0	0	0	1.25	0
Flandre	61.02	50.85	56.91	46.05	84.62	86.06	80.99	76.81	65	36.25
Wallonie	38.98	49.15	43.09	53.95	15.38	13.94	19.01	23.19	33.75	63.75
Median income										
Low	4.8	25.71	6.25	33.22	9.86	11.78	11.03	7.98	7.5	45
Medium	83.9	47.74	81.58	47.37	65.14	53.12	69.58	47.91	70	32.5
High	11.3	26.55	12.17	19.41	25	35.1	19.39	44.11	22.5	22.5
N										
Unique value	354	67	304	99	416	180	263	85	80	22

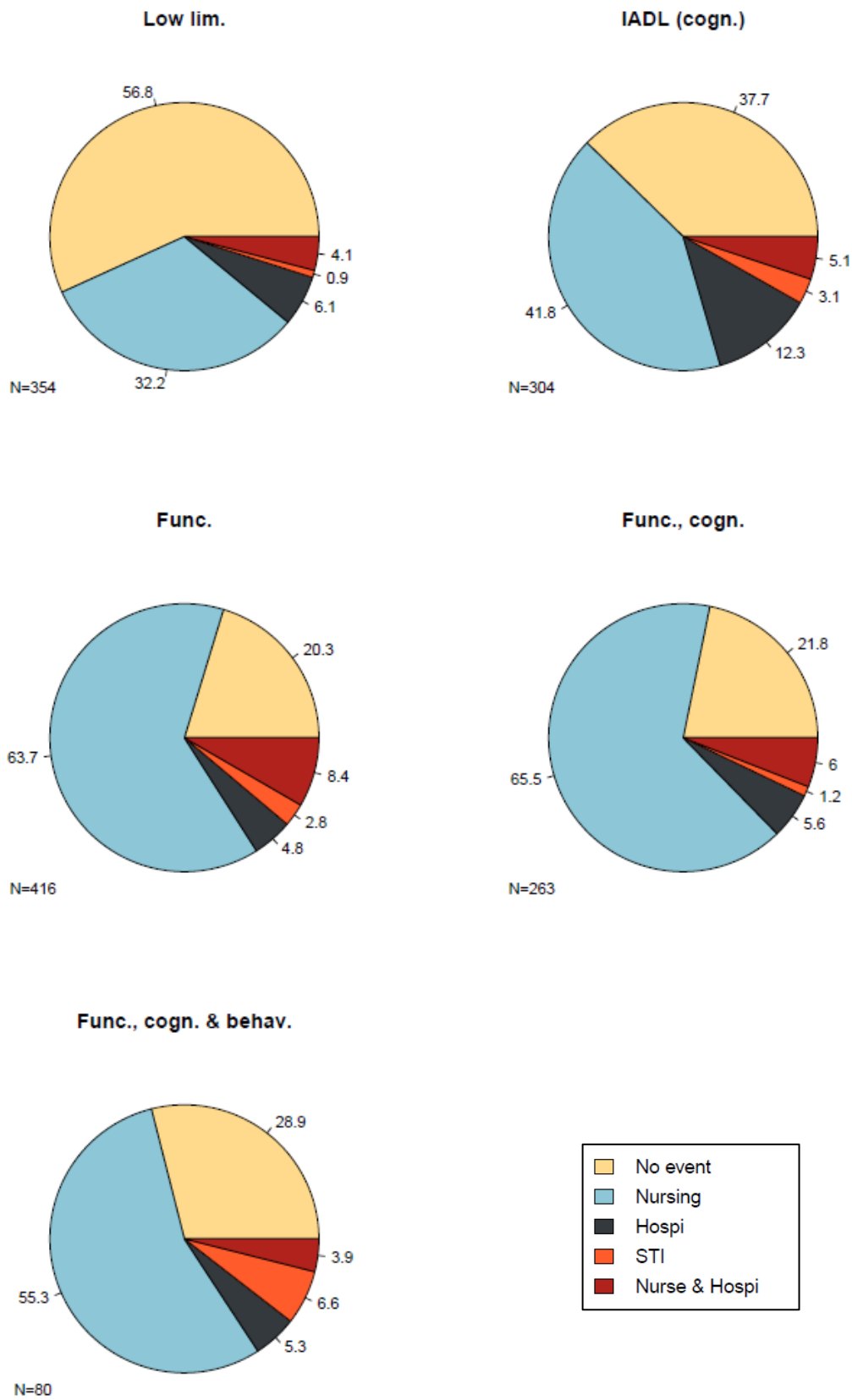
The figure hereafter presents the key previous healthcare utilization pattern of population grouped by disability profiles. Following characteristics may be highlighted:

- The proportion of use of nursing care seems increase with the increase of the dependency
- The proportion of short-term institutionalization was low at the inclusion in this interventions.
- The proportion of clients hospitalized in the two months before the inclusion is significant ranging from 16.7% of the clients with functional, cognitive and behavioral troubles to 26.3% of the clients with functional limitations.

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Figure 18 Description of the historic health care consumption profile per disability profile for F1P010



3.2. Results for the disability profiles

3.2.1. Low limitations

- a) **Slight improvement of IADL** was observed for a small percentage of the clients (10%). No difference were found for ADL and the risk of falls.
- b) **No difference was observed for depression.**
- c) **The burden of the non-cohabitant informal caregivers was higher** for 25% of the intervention group with a burden above 14. The burden of co-habitant informal caregiver was higher for the 25% of the intervention group with a burden below 4.
- d) **A lower perceived quality of life** was found for 20% of clients with Whoqlscore above 31.
- e) **No difference was found on nursing care use**
- f) **There was a higher proportion and frequency of visits to the GP out-of-hours and hospitalizations** in the intervention group.
- g) **There were no significant difference on emergency visits.**
- h) In addition **no significant difference was found for the incidence of institutionalization or death** in this cluster.
- i) **The costs for the NIHDI**
 - The intervention cost estimated was 97 Euro per month per client.
 - The average cost of nursing care per month per client increased in the intervention group (from 83 euro to 136 euro). However, the average cost remained lower than in the control group after six months (562 euro) and the difference between the two groups was significant for 6 months after intervention. For almost all clients, the nursing cost was lower in the intervention group.
 - The cost paid for GP and specialist consultations was lower in the intervention group for all clients.
 - The cost of hospitalizations was higher for 15% of clients in the intervention group.
 - The total cost at home care was significantly lower in the intervention group (average of 149 euro less per month).
 - When including the costs of home care, hospitalization and intervention, the costs were not significantly different.
- j) **The costs for the regions:**
 - The cost of daycare was slightly higher in the intervention group compared to the control group (3 euro versus 0 in the control group).
 - The cost of temporary institutionalizations was higher in the intervention group (27 Euro versus 0 Euro in the control group per month).
 - The cost of definitive institutionalizations was significantly lower in the intervention group (25 Euro versus 54 Euro in the control group).
- k) **The costs for the clients and informal carers**
 - The cost of daycare was slightly higher in the intervention group.
 - The cost of temporary institutionalizations was higher in the intervention group (21 Euro versus 0 Euro).

- The cost of definitive institutionalizations was lower in the intervention group (25 Euro versus 64 Euro in the control group).
- The total net cost for health care services and nursing home was not different in the intervention group compared to the control group.
- Costs of family care, household aid and meals-on-wheels did not change before and after intervention and between the two groups.
- l) **For all stakeholders**, the average total costs were not significantly different between the two groups.
- m) **There was no difference for the total days at home between the two groups.**

3.2.2. IADL impairment (with or without some cognitive problems)

- a) **An significant improvement on IADL performance** can be observed for the 35% of the clients with an IADL score below the cut off score at the second evaluation. This can be due to the fact that after a careful assessment, the case manager can recommend occupational therapy, which is expected to have an impact on IADL.
- b) **A slight deterioration of the ADL score** is observed for the clients with the highest limitations in ADL. There is nevertheless no significant difference in the proportion of the clients below the cut off of the ADL score after the intervention. However, in this group, only 10% of the clients are above the ADL cut off at six months after the inclusion. This means that this group of clients with a high level of limitation in ADL are not the same than the group of clients who had a low level of IADL (previous paragraph).
- c) **Improvement of the burden for non-cohabitants.** A trend towards a decrease in the burden was observed for the informal caregivers who do not live with the frail older person, but for co-habitants, the results showed a trend toward increase in burden. This could be due to information bias, as cohabitant informal caregivers can have more difficulties to express negative feelings about the care they provide, in comparison with non-cohabitants.
- d) **The quality of life is improved** by on average two points on a scale of 66 points for almost 80% of the intervention group. This positive result is not associated with an improvement of the depressive score.
- e) **Lower use of nursing care in the intervention group.** The utilization of nursing care is more limited in the intervention group, which was expected by the lower limitations in ADL. However, 61.7% of clients with significant ADL limitations and 60% of clients with significant ADL and incontinence problems have unmet needs of nursing care. This represents 36.3% of the total intervention group. This proportion is slightly lower at the inclusion (33.5% of the total intervention group). It is also lower in the control group (18.2% at the inclusion and 3.8% after 6 months).
- f) **A slight decrease of the frequency of emergency room visits** is shown for the 10% of clients who use this service most often.
- g) However, there is **an increase in the proportion and the frequency of hospitalization and GP out-of-hours visits** in comparison with the control group.
- h) **There is no significant difference on the incidence of death or institutionalization.**
- i) **The costs for the NIHDI:**

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- The estimated intervention cost was 88 euro per months per client.
- The average cost of nursing care increased in the intervention group from 118 to 205 euro. However, the average cost remained lower in the intervention group than in the control group after six months (894 Euro) and the difference between the two groups was significant for 6 months after intervention. For almost all clients, the nursing cost was lower in the intervention group.
- The cost paid for GP and specialist consultations was lower in the intervention group for all clients.
- The cost of hospitalizations was higher for 30% of clients in the intervention group.
- The costs at home were lower in the intervention group (average of 347 euro less in the intervention compared to the control group per month).
- When including the costs of hospitalization and intervention, the costs were still lower (280 in average per month). For about 80% of clients, the net cost was lower in the intervention group.

j) **The costs for the regions**

- No change was observed for the cost of daycare.
- The cost of temporary institutionalizations was higher in the intervention group (56 euro versus 7 euro in the control group). However, this was the same difference observed before intervention.
- The cost of definitive institutionalizations was not different between the two groups. The cost was 80 euros for the clients in the intervention group.

k) **The costs for the clients and informal carers**

- For reimbursed health care services and nursing home, the costs were not significantly different than in the control group.
- No change was observed for the cost of daycare.
- The cost of temporary institutionalizations was higher in the intervention group (52 vs 8 euro).
- The cost of definitive institutionalizations was not different between the two groups.
- No changes were observed for family care cost.
- No differences for the household aid cost.
- No differences were observed for the cost of meals-on wheels.

l) For all stakeholders, the net cost difference between the intervention and the control group was not significantly different.

m) **There were about 20% of clients with a lower number of days at home in the intervention group.**

3.2.3. Functional (IADL & ADL impairment)

a) Significant improvement of the functional limitations (ADL and IADL). First, an **improvement** on IADL for 40% the clients who have an IADL score lower than 30 in the intervention group compared to the control group. In this group, we observed a decrease up to 10 points on a scale of 48. Second, a **improvement of ADL** for the 20% of the clients ADL score lower than the cut-off, with a decrease up to 2 points on a scale of 6. The proportion of clients above the ADL cut-off decreases 15% in the

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intervention group for only 5% in the control group. This difference of proportion is also significant. No significant difference was found on the risk of falls.

b) No significant difference was found for the burden of the informal caregiver.

c) The depressive symptoms show a trend of improvement but this trend is not significant.

d) Improvement on the quality of life. Case management FIP010 is associated with an improvement of perceived quality of life of 50% of clients with the best perceived quality of life of this group (decrease of 2 points on scale of 66). The improvement of the functional limitations may explain the best perception of the quality of life and the slight but not significant decrease of depressive symptoms.

e) Lower use of nursing care in the intervention group. Before the inclusion 23.3% of the intervention group and 5.8% of the control group had unmet needs of nursing care. No unjustified consumption of nursing care was shown in this group. At the second evaluation, 15.5% of the intervention group and 0.8% of the control group remain with unmet need of nursing care.

f) The frequency of emergency and GP out-of-hours visits were lower in the intervention group. There is no difference in the proportion of clients using the emergency department but the users in the intervention group return less frequently to the emergency room. The same interpretation can be done for the GP out-of-hours visits.

g) The intervention group seems to be better stabilized at home. That can be confirm by a significant increase of the proportion and the frequency of planned hospitalization. The number of hospitalisation increase but not the emergency visits. So, we can make the assumption that these hospitalisations are planned and are not crisis hospitalisations.

h) The intervention group has a higher risk of institutionalization. This increase cannot be explained by the end-of -life stage because the incidence of death is similar in the two groups. In addition, the clients with only functional limitations could be a target population for home maintenance, so a higher incidence of institutionalization cannot be explained at first hand.

a) The costs for the NIHDI:

- The estimated intervention cost was 114 euro per months per client.
- The average cost of nursing care increased in the intervention group from 363 to 565 euro. However, the average cost remained lower in the intervention group than in the control group after six months (1331 Euro) and the difference between the two groups was significant for 6 months after intervention. For all clients, the nursing cost was lower in the intervention group.
- The cost paid for GP and specialist consultations was lower in the intervention group for all clients.
- The cost of hospitalizations was higher in the intervention group for 25% of clients.
- The costs incurred at home are lower in the intervention group (average 411 euro per client per month less than in the control group).
- When we include the costs of hospitalizations and intervention, the costs were still lower (412 euro in average per month). For about 80% of clients, the net cost was lower in the intervention group.

b) The costs for the regions:

- No change was observed for the cost of daycare.

- The cost of temporary institutionalizations was higher in the intervention group (60 euro versus 18 euro in the control group). However, the same difference was observed before intervention.
- The cost of definitive institutionalizations was higher in the intervention group (69 euro versus 11 euro in the control group)

c) The costs for the clients and informal carers

- For reimbursed health care services and nursing home, for 20% of clients, the cost was higher in the intervention group than in the control group.
- No change was observed for the cost of daycare.
- The cost of temporary institutionalizations was higher in the intervention group but the same difference was observed before intervention.
- The cost of definitive institutionalizations was higher in the intervention group (58 Euro versus 14 Euro).
- No changes were observed for family care cost.
- No differences for the household aid cost.
- No differences were observed for the cost of meals-on wheels.

d) For all stakeholders, the net cost was significantly lower in the intervention group: 256 Euro less. The total cost was lower for 75% clients.

e) There was no difference in the total number of days spent at home between treated and control group.

3.2.4. Functional and cognitive problems (ADL, CPS)

- More limited improvement of the functional limitations** when the clients combined functional and cognitive limitations than when the clients had only functional limitation. We observe a significant decrease of IADL impairment for 25% of clients with an IADL score lower than 38, up to 3 points on a scale of 48. The ADL limitations remain unchanged between the first and the second evaluation.
- There was a significant decrease of depressive symptoms for 25% of the clients with a low depressive status.** This improvement is confirmed by the perceived quality of life. Indeed, a improvement on the quality of life was observed for 15% of the clients with a good quality of life up to 2 points on a scales of 66.
- The Zarit scores of co-habitants show a slight trend to improvement** especially for the 20% of the informal caregivers with the highest burden up to 4 points on a scale of 48. No significant changes were found for non-cohabitant informal caregivers.
- The proportion of nursing care is significantly higher in the control group.** The proportion is already very high in the two groups which is consistent with the profile of dependency of these clients. No unjustified use of nursing care was observed in the intervention group. However, clients without ADL and incontinence problems still use nursing care representing 6.4% of the total control group. At the inclusion, 26.3% of the intervention group and 7.2% of the control group, having ADL and incontinence problems and justifying the use of nursing care, do not receive nursing care. After 6 months, these proportions were reduced to 18.8% in the intervention group and 0% in the control group.

e) **More use of the day care centre in the intervention group.** About 12.5% of the clients in the intervention group visit a day care centre for only 1.16% in the control group. The increase of this proportion in this group is a good result because day care centres are recommended for clients with cognitive impairment and for whom the informal caregiver has high burden because they are considered as a form of respite care. This difference about the use of day care centres between the intervention and the control group cannot be explained by a geographic difference because the proportion of Flemish and Walloons are similar in the intervention and control group.

f) **The intervention does not associated with a decrease of the inappropriate use of services,** because we observe an increase in both the hospitalization proportion and in GP out-of-hours proportion. No significant difference was found for emergency department visits.

g) **The risk of institutionalization is higher in the intervention group.** In this case institutionalization may be considered as a desirable outcome, given the high profile of dependency of the clients.

f) The costs for the NIHDI:

- The estimated intervention cost was 102 euro per months per client.
- The average cost of nursing care increased in the intervention group from 471 to 773 Euro. However, the average cost remained lower in the intervention group than in the control group after six months (1822 Euro) and the difference between the two groups was significant for 6 months after intervention. For all clients, the nursing cost was lower in the intervention group.
- The total medical cost paid for GP and specialist consultations was lower in the intervention group for all clients.
- No difference was observed for the cost of hospitalizations.
- The costs incurred at home (by including the group of functional limitations, cognitive impairment and behavioral problems), were lower in the intervention group (average 517 euro per client per month less than in the control group, by including also the persons with behavioral problems).
- When we include the costs of hospitalization and of the intervention (by also including the group of functional limitations, cognitive impairment and behavioral problems), the costs were still lower in the intervention group (637 euro less, by including also the persons with behavioral problems). For almost all clients, the net cost was lower in the intervention group (by including the group with behavioral problems).

g) The costs for the regions:

- Daycare cost was higher in the intervention group (43 euro versus 10 euro in the control group per month).
- The cost of temporary institutionalizations was higher in the intervention group (67 euro versus 19 euro in the control group).
- The cost of definitive institutionalizations was higher in the intervention group (112 euro versus 54 euro in the control group)

h) The costs for the clients and informal carers

- The total cost of reimbursed health care and nursing home was higher for 35% of client in the intervention group.
- The cost of daycare was higher in the intervention group than in the control group before and after intervention, no change was observed.
- The cost of temporary institutionalizations was higher in the intervention group than in the control group before and after intervention, no change was observed.

- The cost of definitive institutionalizations was higher in the intervention group (86 euro versus 42 euro in the control group)
 - No changes were observed for family care cost.
 - No differences for the household aid cost.
 - No differences were observed for the cost of meals-on wheels.
- i) **For all stakeholders**, the net cost was significantly lower in the intervention group (by including also the group with behavioral problems) : 395 euro less. The total cost was lower for 75% clients (without the group with behavioral problems).
- j) There was about 25% of clients with a lower number of days at home in the intervention group than in the control group.

3.2.5. Functional, cognitive and behavior problems (ADL, CPS and also behavior group)

- a) **Improvement of functional limitations for clients with low limitations.** Case management F1P010 was associated with a decrease of IADL impairment for 15% of clients with IADL score lower than 35 but has an opposite increase of ADL impairment for frail older people with ADL scores above 4. Above a certain level of functional limitation, the improvement of functional limitation does not seem plausible but the other outcomes allow to evaluate the impact of the CM for these clients.
- b) **There was a significant decrease the burden of the informal caregivers** if the level of burden was around the cut-off of 10 (40% of non-cohabitants and 20% of co-habitants). This decrease is up to 10 points on a scale of 66 for the co-habitant and up to 5 points for the non-cohabitant. However, for co-habitant caregivers, the burden increased if this burden was at a very high level (above 20).
- c) The positive results on the Zarit are confirmed by a significant increase of **the perceived quality of life** of the 25% clients with the worst perceived quality of life in the intervention group compared to the control group, with an improvement until 15 points on a scale of 48.
- d) **The proportion of nursing care is significantly higher in the control group.** The proportion of unmet needs at the inclusion was very high considering the high level of dependency of the clients. This very high unmet need is known in the literature for clients with important cognitive and behavioural problems. At the inclusion, 58.3% of the clients with ADL limitations and 25% of the clients with ADL and incontinence problems don't use nursing care in the intervention group which represents 31.6% of the total intervention group. In the control group, these proportion are respectively 22.7%, 45.8% which represents 34.1% of the total control group. At the second evaluation, only 6.3% of the total control group presents still unmet needs for 25.3% of the intervention group. The CM doesn't seem to respond totally adequately to meet these needs.
- e) **Higher utilisation of day care centre in the intervention group.** About 13% of the intervention group visits a day care centre while only 3.77% in the control group. The increase of this proportion in the intervention group is also a good result because day care centres are indicated for clients with cognitive problems and with informal caregivers with high burden. This difference between intervention and control group can be explained by a geographic difference since the proportions of Flemish and Walloons are different in the intervention and control group and the day care centres are more developed in the Flemish region.
- f) **The frequency of emergency visits was lower in the intervention group although the** proportion of utilisation was not different. However, the users of the intervention group return up to 2 times less to the emergency department than the users of the control group.

g) **The incidence of institutionalization is significantly higher in the intervention group.** This institutionalization can be justified by the profile of dependency of the clients. The case manager must, as it is the case in this example, target the population for whom the institutionalization is the best solution.

a) The cost for the NIHDI:

- The estimated intervention cost was 97 euro per months per client.
- The average cost of nursing care increased in the intervention group from 433 to 599 euro. However, the average cost remained lower in the intervention group than in the control group after six months (1453 euro) and the difference between the two groups was significant for 6 months after intervention. For 75% of clients, the nursing cost was lower in the intervention group.
- The total medical cost was lower in the intervention group for 90% of the clients.
- No difference was observed for the cost of hospitalizations between the two groups.
- The cost of hospitalization not significantly different.
- The costs incurred at home (by including the group of functional limitations, cognitive impairment and behavioral problems), were lower in the intervention group (average 533 euro per client per month less than in the control group, by including also the persons with behavioral problems).
- When we include the costs of hospitalization and of the intervention (by also including the group of functional limitations, cognitive impairment and behavioral problems), the costs were still lower in the intervention group (545 euro less, by including also the persons with behavioral problems). For about 80% of clients, the net cost was lower in the intervention group (by also including the group of functional limitation and cognitive impairment).

b) The cost for the regions

- Daycare cost was not different between the two groups.
- The cost of temporary institutionalizations was not different between the two groups.
- The cost of definitive institutionalizations was higher in the intervention group (183 euro versus 16 euro in the control group)

c) The cost for the clients and informal carers

- The reimbursed health care and nursing home were significantly higher for the intervention group for 20% of the clients.
- The monthly cost of daycare was not different.
- No change was observed for the cost of temporary stays in nursing home
- The cost of definitive institutionalizations was higher in the intervention group (146 euro versus 6 euro in the control group).
- No changes were observed for family care cost.
- No differences for the household aid cost.
- No differences were observed for the cost of meals-on wheels.

d) For all stakeholders, the net cost was significantly lower in the intervention group (by including also the group functional limitations and cognitive impairment): 395 euro less. The total cost was lower for 40% clients (without the group with behavioral problems).

e) There was about 25% of clients with a lower number of days at home in the intervention group than in the control group.

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4.1. Description of the target population

4.1.1. Disability profiles

Description of disability profiles

The beneficiaries of interventions without proper case management, without psychological support were clustered in five disability profiles:

- **Clients with low limitations:** low functional and cognitive impairments but 61% of this group had a score on the DRS scales above the cut-off. These clients suffered from significant depressive symptoms.
- **Clients with IADL difficulties and initial cognitive impairments:** 98% of this group had a score of IADL scale above the IADL cut-off which means important difficulties on IADL tasks. Only 9% of this group had a score on CPS scale above the CPS cut-off which means important cognitive impairment. However, one half of this group presented initial cognitive impairments with a CPS score of 1 or 2 on a 6-point scale.
- **Clients with functional limitations:** 95% and 100% of this group had respectively a score of IADL and ADL scales above the cut-off of these scales. This means that these clients had significant functional limitations. The cognitive impairment was limited in this group with 50% of the clients with a score of 0 on the CPS scales and any CPS score above the CPS cut-off.
- **Clients with functional and cognitive impairments :** the clients in this group combined functional (with respectively 100% and 88% of the clients with a score on the IADL and ADL scales above the cut-off of these scales) , cognitive impairments (97% of the clients with a score on the CPS scale above the cut-off of this scale)
- **Clients with functional and cognitive impairments and in addition behavioral problems:** : the clients in this group combined functional (with respectively 100% and 85% of the clients with a score on the IADL and ADL scales above the cut-off of these scales) , cognitive impairments (85% of the clients with a score on the CPS scale above the cut-off of this scale) , behavioral problems (100% of the clients had at least one behavioral problem), and depressive symptoms (73% of clients had a DRS score above the cut-off).

Description of socio-demographic characteristics before inclusion

There are significant differences for age and gender between the intervention group and the control group for all clusters, except for the cluster of functional impairment. Except for the low limitation cluster, all clusters show significant differences for the median income. In this type of intervention, contrary to other interventions, the group receiving case management has a higher percentage of clients in the high median income groups than in the control group. This means that the intervention group has a higher proportion of people in the higher income groups according to the region distribution of frail older people.

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Table 10 Sociodemographic characteristics per disability profile for F1P110

	low limit.		IADL, (cogn.)		func.		func., cogn.		func., cogn., behav.	
	T	C	T	C	T	C	T	C	T	C
Age										
Median[IQR]	77[70-82]	81[76-87]	80[71-84]	81[76-86]	82[75-87]	84[79-88]	83[76-87]	84[78-88]	82[70-88]	84[74-90]
Gender										
% Men	13.39	20.47	20	28	25.2	18.7	34.88	20.93	46.15	23.08
% Women	86.61	79.53	80	72	74.8	81.3	65.12	79.07	53.85	76.92
ICG										
% No ICG	51.97	51.18	18	18	6.5	6.5	0	0	0	0
% No cohabitant	39.37	40.16	54	55	65.85	65.04	44.19	44.19	42.31	42.31
% Cohabitant	8.66	8.66	28	27	27.64	28.46	55.81	55.81	57.69	57.69
Region										
Bruxelles	0	0	0	0	0	0	0	0	0	0
Flandre	36.22	40.16	36	37	78.86	84.55	75.58	75.58	69.23	50
Wallonie	63.78	59.84	64	63	21.14	15.45	24.42	24.42	30.77	50
Median income										
Low	37.01	25.2	36	39	8.94	11.38	1.16	6.98	7.69	42.31
Medium	39.37	47.24	27	33	17.07	46.34	29.07	50	23.08	46.15
High	23.62	27.56	37	28	73.98	42.28	69.77	43.02	69.23	11.54
N										
Unique value	127	46	100	61	123	80	86	47	26	14

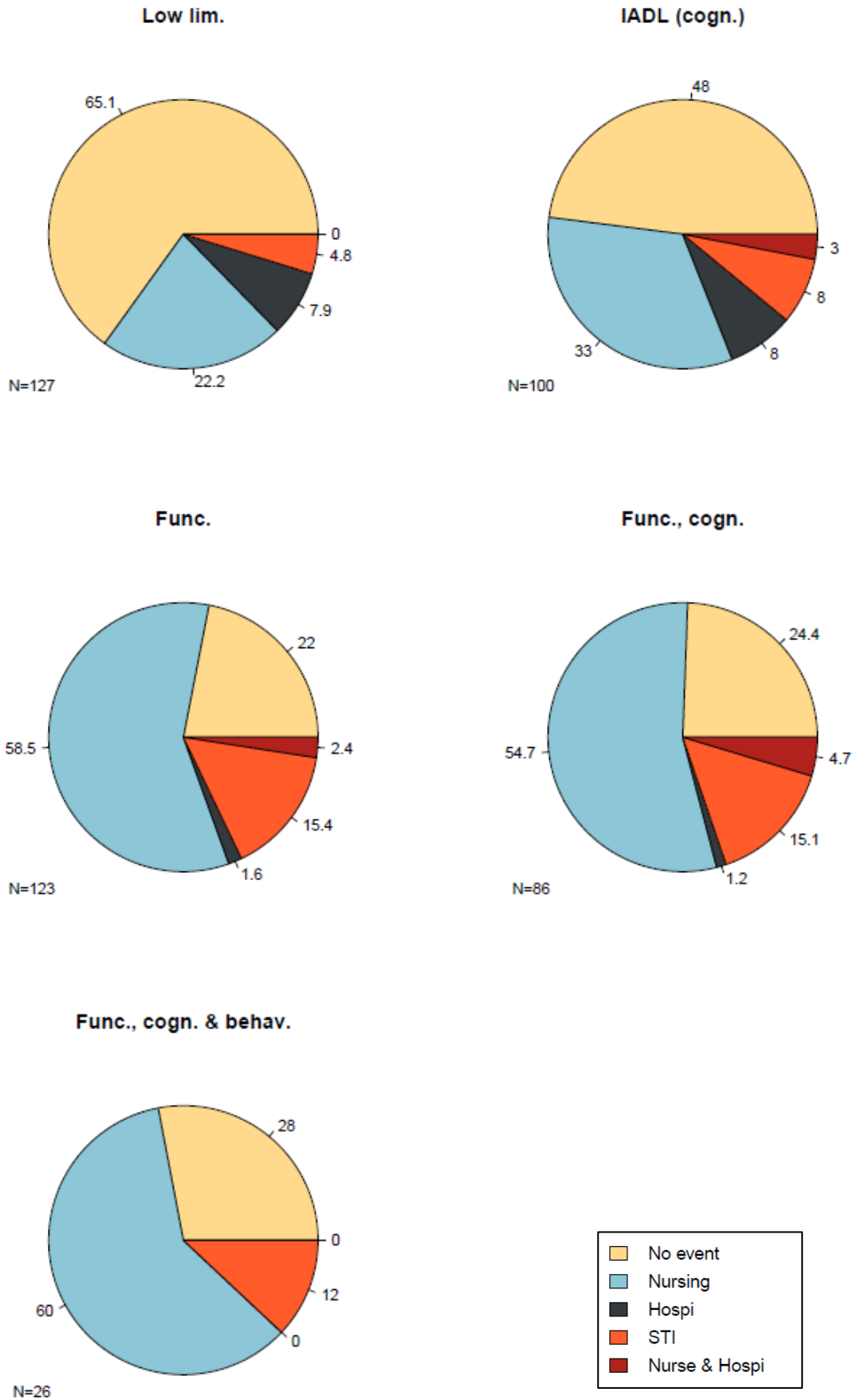
The figure hereafter presents the key previous healthcare utilization pattern of population grouped by disability profiles. Following characteristics may be highlighted:

- The clients included in this intervention were less hospitalized before the inclusion (compared to the clients of others interventions)
- The unmet need of nursing care was limited at the inclusion. The clients combining functional, cognitive and behavioural troubles are clients with significant unmet of nursing care need but in this intervention group, 60% had nursing care at the inclusion.
- The proportion of clients using the short-term institutionalization is high at the inclusion in this project. That can be explained by a specific disability profile of the clients or the umbrella organisation?

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Figure 19 Description of the historic health care consumption profile per disability profile for F1P110



4.2. Results for the disability profiles

4.2.1. Low limitations

- a) **No difference on the functional limitations.** The results showed no significant difference on IADL or ADL performance. Since in this cluster only 15% of people have IADL impairment, a difference was not really expected. A significant reduction of the risk of falls was observed.
- b) **No difference on the burden or quality of life.** Although the high levels of depression in this cluster, no difference on depression, perceived quality of life or informal caregiver's burden was observed. Although psychological support is offered to clients, maybe this is at such a low level of intensity that it shows no association with perceived wellbeing of the clients.
- c) **The proportion of use of nursing care is smaller in the intervention group.** Case management F1P110 is associated with a lower proportion of nursing care.
- d) **A decrease of the proportion of use and the frequency of emergency visits is shown.**
- e) **No difference was found for hospitalization, GP out-of-hours visits, institutionalization or death.**
- f) **The costs for the NIHDI**
 - The intervention cost estimated was 129 euro per month per client.
 - The average cost of nursing care per month per client has increased in the intervention group (from 35 euro to 136 euro). However, the average cost remained lower than in the control group after six months (610 euro). This difference in the level of costs was not significant after controlling with the difference before: the same difference observed before intervention remained after intervention.
 - The cost paid for GP and specialist consultations was not different between the two groups.
 - The cost of hospitalizations was not different between the two groups.
 - The total costs at home care was significantly lower in the intervention group (average of 116 euro less per month).
 - When including the costs of home care, hospitalization and intervention, the costs were not significantly different.
- g) **The costs for the regions:**
 - There was no significant difference for the cost of daycare.
 - The cost of temporary institutionalizations was slightly higher in the intervention group. The cost was 9.6 euro per month per client in the intervention group versus 0 in the control group.
 - There was no significant difference for the cost of definitive institutionalizations. The cost is 21 euro per client per month in the intervention group.
- h) **The costs for the clients and informal carers**
 - There was no significant difference for the cost of daycare.
 - The cost of temporary institutionalizations was slightly higher in the intervention group (12 euro for the intervention group and 0 for the control group).
 - There was no significant difference for the cost of definitive institutionalizations.
 - The total net cost for health care services and nursing home was not different in the intervention group compared to the control group.

- Costs of family care, household aid and meals-on-wheels did not change before and after intervention and between the two groups.
- i) **For all stakeholders**, the total net costs was not significantly different between the two groups
- j) There was no difference for the total days at home between the two groups.

4.2.2. IADL impairment (with or without some cognitive problems)

- a) **Improvement limited on the functional limitations.** A trend of improvement is observed on the IADL for clients with IADL limitations and initial cognitive problems. This trend is significant for about 15% of the clients with IADL scores around the value of 35, which means extensive assistance in IADL. No significant improvement on ADL and on the risk of falls was observed.
- b) **Significant improvement of the burden of the non-cohabitant ICG with a high burden at the onset.** Case management F1P1I0 is associated with a significant trend of decreasing burden of informal caregivers who do not live with the frail older person. This is the case for about 25% of informal caregivers non-cohabitants with a high value of the Zarit score from 18 up to 4 points on a scale of 48. However, for co-habitants, the burden tends to increase and this increase is significant for 35% of caregivers in comparison with the control group up to 6 points on a scale of 48.
- c) **The quality of life is slightly improved for the 10% of clients in the intervention group with a low quality of life.** The quality of life is improved by on average two points on a scale of 66 for almost 10% of the intervention group with a bad quality of life.
- d) **The positive result on the quality of life scores is not associated with an improvement of the depression score.**
- e) **The intervention group use lower nursing care than control group.** 48.3% of the clients without ADL and incontinence problems use nursing care for 63.2% of this population in the control group. These proportion corresponds respectively to 14.3% of the total intervention group and 12.2% of the total control group. About 34% of the clients with ADL limitation and 20% of the clients with ADL and incontinence problems don't receive any nursing care in the intervention group which corresponds to 16.3% of the total intervention group. In the control group, only 13% of the clients with ADL and incontinence problems do not receive nursing care which corresponds to 3.1% of the total. However, the control group has less unmet needs in nursing care at the inclusion with only 10.2% of the total with unmet needs for 33.6% in the intervention group.
- f) **A decrease of the proportion of use and the frequency of emergency visits is shown.**
- g) **No difference was found for hospitalization, GP out-of-hours visits, institutionalization or death.**
- h) **The costs for the NIHDI:**
 - The estimated intervention cost was 142 euro per months per client.
 - The average cost of nursing care increased in the intervention group (from 55 to 256 euro). In the control group this cost is higher (714 euros per client per month) but also starts at a higher level (249 euro).
 - The cost paid for GP and specialist consultations was slightly lower in the intervention group for almost 50% of clients.
 - No difference was observed for the cost of hospitalizations.

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- The costs at home were lower in the intervention group (average of 281 euro less in the intervention compared to the control group per month, by also including functional limitations). When including the costs of hospitalization and intervention, the costs was significantly lower (304 Euro less in average, by also including functional limitations). It was observed for 25% of clients.

i) The costs for the regions

- No change was observed for the cost of daycare.
- The cost of temporary institutionalizations was not different between the two groups.
- The cost of definitive institutionalizations was not different between the two groups. The cost was 40 euros per month per client for the intervention group.

j) The costs for the clients and informal carers

- For reimbursed health care services and nursing home, the total cost was not different between the two groups
- No change was observed for the cost of daycare.
- The cost of temporary institutionalizations was not different between the two groups.
- The cost of definitive institutionalizations was not different between the two groups.
- No changes were observed for family care cost.
- No differences for the household aid cost.
- No differences were observed for the cost of meals-on wheels.

k) **For all stakeholders**, the net cost difference between the intervention and the control group was not significantly different (by also including functional limitations).

l) **There was no difference in the total number of days** spent at home between treated and control group.

4.2.3. Functional (IADL & ADL impairment)

a) Limited improvement **on the functional limitations**. We observe a slight decrease in ADL impairment for about 25% of the clients with ADL score lower than 3. No difference was found for the IADL impairment and the incidence of falls.

b) **No difference was observed on the informal caregiver's burden**. This result was affected by a lot of missing values (up to 60% in the second evaluation). It is questionable that CM with a psychological component does not complete the scale about the Zarit of informal caregivers.

c) **No difference is shown for the perceived quality of life**.

d) **The depressive symptoms show a trend of improvement but this trend is not significant**.

e) **The proportion of nursing care is significantly lower in the intervention group**. In the control group all clients with significant ADL or incontinence problems receive nursing care. However, in the intervention group, 22% of the clients with ADL limitation and 12.3% of the clients with ADL and incontinence problems do not receive nursing care which represents 13.1% of the total intervention group. These clients remain with unmet needs. However, at the inclusion in the project 51.6% of the total intervention group had unmet need of nursing care. The projects reduced by nearly 4 times this

proportion. In the control group only 1.6% of the total group had unmet needs at the inclusion but this can be explained by the selection of the control group which was among nursing care organizations.

f) **No other difference was found for this intervention on the use of services.**

g) **No difference were found for institutionalization or death.**

f) **The costs for the NIHDI**

- The estimated intervention cost was 224 euro per months per client.
- The average cost of nursing care increased in the intervention group from 228 to 748 euro. The same difference between the two groups was observed before and after intervention.
- The cost paid for GP and specialist consultations was slightly lower in the intervention group.
- No difference was observed for the cost of hospitalisations.
- The costs at home were lower in the intervention group (average of 281 euro less in the intervention compared to the control group per month, by also including IADL limitations). When including the costs of hospitalization and intervention, the costs were significantly lower (304 euro less in average, by also including functional limitations).

g) **The costs for the regions:**

- No change was observed for the cost of daycare.
- The cost of definitive institutionalizations was higher in the intervention group (31 euro versus 1.7 euro in the control group).
- The cost of temporary institutionalizations was not different between the two groups.

h) **The costs for the clients and informal carers**

- There was no difference for the total cost of reimbursed health care services and nursing home.
- No change was observed for the cost of daycare.
- The cost of temporary institutionalizations was not different between the two groups.
- The cost of definitive institutionalizations was higher in the intervention group (39 euro versus 4 euro).
- The informal care cost remained stable. No difference was observed at six months.
- The household aid cost increased significantly in comparison with the control group (741 versus 409 euro in the control group at six months).
- The cost of meals-on wheels increased was not different between the two groups

i) **For all stakeholders**, the net cost was not different between the two groups (by including IADL (cogn.).

j) **There was no difference in the total number of days** spent at home between treated and control group.

4.2.4. Functional and cognitive problems (ADL, CPS)

a) **Slight improvement of functional limitation for clients with the lowest level of limitations in this group.** A improvement is observed for the IADL limitations for about 20% of the clients with IADL score lower than 38 at the second evaluation. The decrease was of up to 2 points in

a scale of 48. In addition, an improvement on ADL was found for about 35% of the clients up to 2 points in a scale of 6. These can be considered very good results for this cluster.

- b) A significant improvement was found for the burden of the informal caregiver for co-habitants** for the 20% with a Zarit score around 18 up to 4 points on a scale of 48. No difference was found for non-cohabitants.
- c) No difference was found for depression or perceived quality of life.**
- d) No difference of the use of nursing care.** The use of nursing care stays non-covered for 26.1% of clients with ADL limitation and 16.7% of clients with ADL and incontinence problems in the intervention group while all needs are covered in the control group (selection). However, at the inclusion 47% of the intervention group had unmet need of nursing care for only 12.9% of the control group. This decrease in unmet needs shows that the project target the clients who needed nursing services.
- e) The frequency of utilization of GP out-of-hours is higher among the clients in the intervention group.**
- f) There is a higher proportion of hospitalizations in the intervention group but this difference is not significant.**
- g) No significant difference was found for emergency department visits.**
- h) There is no difference on the risk of institutionalization or death.**
- a) The costs for the NIHDI:**
 - The estimated intervention cost was 254 euro per months per client.
 - The average cost of nursing care increased in the intervention group from 265 to 1139 euro. The same difference was observed before intervention.
 - The total medical cost paid for GP and specialist consultations was not different between the two groups.
 - No difference was observed for the cost of hospitalizations.
 - The costs incurred at home (by including the group of functional limitations, cognitive impairment and behavioral problems) was not different.
 - When we include the costs of hospitalization and of the intervention, there was no significant difference (by including the group of functional limitations, cognitive impairment and behavioral problems) .
- b) The costs for the regions:**
 - No change was observed for the cost of daycare.
 - The cost of temporary institutionalizations was not different between the two groups.
 - The cost of definitive institutionalizations was not different between the two groups. This cost was 100 euro per month per client in the intervention group.
- c) The costs for the clients and informal carers**
 - The reimbursed health care and nursing home were not significantly different between the two groups.
 - No change was observed for the cost of daycare.
 - The cost of temporary institutionalizations was not different between the two groups.
 - The cost of definitive institutionalizations was not different between the two groups.
 - The informal care cost remained stable before and after intervention. There is no difference between the intervention and the control groups.

- The cost of household aid did not change in the two groups. No difference was observed at baseline or after intervention.
- The same difference of cost of meals-on wheels was observed before and at six months between the two groups: the cost was lower in the intervention group.

d) For all stakeholders, the total net cost was not different between the two groups.

e) There was no difference in the total number of days spent at home between treated and control group.

4.2.5. Functional and cognitive problems (ADL, CPS and also behavior group)

The group functional, cognitive and behavioral problems consists of only 26 clients in this type of intervention. Some statistical analysis are difficult to interpret with this small number of clients.

- a) No difference was observed on the functional outcomes, the informal caregiver's burden and the quality of life in this cluster.**
- b) Even after the intervention, some unmet needs of nursing care remain.** There were important unmet needs at the inclusion in the intervention group (80% of clients with ADL limitations and 60% of clients with ADL and incontinence problems for a total of 54.2% of intervention group with unmet needs) but also in the control group (50% of clients with ADL limitations and 41.7% of clients with ADL and incontinence problems for a total of 41.6% of intervention group with unmet needs). At the second evaluation, the unmet needs were totally covered in the control group (selection) but in the intervention groups these unmet needs remained uncovered for 25% of the intervention group.
- c) The frequency of use of emergency department was lower in the intervention group.** The proportion of utilization was not significantly different but the frequency decreased up to 4 times for the users of this service in the intervention group.
- d) No significant differences were observed on the hospitalization and the GP out-of-hours visits.**
- e) No significant difference was shown on the risk of institutionalization or death.** We will expect that the CM with a psychological support component helps clients with high dependency to accept the institutionalization and prepare their entrance in nursing homes. The rates of institutionalization were although not different than in the control group.
- k) The costs for the NIHDI:**
- The estimated intervention cost was 223 euro per months per client.
 - The average cost of nursing care increased in the intervention group from 150 to 847 euro. However, the nursing costs remained significantly lower in the intervention group than in the control in the period of 6 months. The same difference was observed before intervention.
 - The total medical cost was slightly lower in the intervention group for 40% of the clients.
 - No difference was observed for the cost of hospitalizations.
 - The costs incurred at home (by including the group of functional limitations, cognitive impairment) was not different.
 - When we include the costs of hospitalization and of the intervention, there was no significant difference (by including the group of functional limitations, cognitive impairment).

l) The costs for the regions:

- There was no difference between the two groups for daycare costs.
- There was no significant difference in the cost of temporary institutionalization.
- The difference of the cost of definitive institutionalizations was significant. The costs was higher in the intervention group (75 versus 6 euro).

m) The costs for the clients and informal carers

- The reimbursed health care and nursing home were not significantly different between the two groups.
- The cost of day care was lower in the intervention group. This was 26 euro in the control group and 0 in the intervention group. However, this difference was already observed before intervention.
- No change was observed for the cost of daycare.
- The cost of temporary institutionalizations was not different between the two groups.
- The cost of definitive institutionalizations was higher in the intervention group (89 euro versus 7 euro in the control group).
- No changes were observed for family care cost.
- No differences for the household aid cost.
- No differences were observed for the cost of meals-on wheels.

n) For all stakeholders, the total net cost was not different between the two groups.

o) There was no difference in the total number of days spent at home between treated and control group.

5. Results of the effectiveness and the costs: Intervention with proper case management and a low intensity

5.1. Description of the target population

5.1.1. Historic health care profiles

Description of historic health care consumption profiles

The beneficiaries of interventions with proper case management and a low intensity were grouped in five historic health care consumption profiles:

- Clients without specific health care consumption before the inclusion in the intervention
- Clients with (hygiene) nursing care (for at least 3 months in the year before the inclusion, at least 2 times per week)
- Clients with recent hospitalization (hospitalization for more than one day in the two months before inclusion)
- Clients with short term institutionalization in the year before inclusion
- Clients with recent hospitalization and (hygiene) nursing care

Table 11 Socio-demographic characteristics per historic health care profile for F110

	No event		Nursing		Hospi		STI		Nursing, hospi	
	T	C	T	C	T	C	T	C	T	C
Age										
Median[IQR]	81[75-85]	80[74-85]	82[76-87]	82[77-87]	82[77-85]	82[78-85]	82[77-88]	84[79-89]	83[77-87]	85[79-88]
Gender										
% Men	32.35	42.83	32.82	30.38	32.35	42.16	23.68	15.79	31.53	47.75
% Women	67.65	57.17	67.18	69.62	67.65	57.84	76.32	84.21	68.47	52.25
ICG										
% No ICG	17.83	-	9.65	-	13.73	-	18.42	-	7.21	-
% No cohabitant	49.45	-	50	-	56.86	-	47.37	-	59.46	-
% Cohabitant	32.72	-	40.35	-	29.41	-	34.21	-	33.33	-
Region										
Bruxelles	0.37	9.74	0	5.43	0	12.75	0	2.63	0	2.7
Flandre	49.63	54.41	76.39	65.96	40.2	50.98	81.58	50	69.37	60.36
Wallonie	50	35.85	23.61	28.6	59.8	36.27	18.42	47.37	30.63	36.94
Median income										
Low	11.03	29.96	3.1	22.73	8.82	33.33	5.26	31.58	7.21	33.33
Medium	66.18	46.88	63.75	50.11	81.37	50	34.21	47.37	69.37	50.45
High	22.79	23.16	33.15	27.16	9.8	16.67	60.53	21.05	23.42	16.22
N										
Unique value	544	483	902	618	102	91	38	32	111	83

Description of the sociodemographic variables for each historic health care consumption profile

The figure hereafter presents the key previous disability profile of population grouped by historic health care consumption profiles. Following characteristics may be highlighted:

- A limited proportion of unmet needs (clients with significant functional limitations who don't benefit of nursing care) in nursing care can be observed in the group "no event" and hospitalization.

Chapter 4 Results of case management interventions

5 Results of the effectiveness and the costs: Intervention with proper case management and a low intensity

- The nursing care was for the majority provided to clients with functional limitations or combining functional and cognitive impairments.
- The short term institutionalization was used mainly by clients with functional limitations or clients combining functional and cognitive impairments. The short term institutionalization was justified for these clients after a hospitalization or as a respite period for the informal caregivers.

Chapter 4 Results of case management interventions

5 Results of the effectiveness and the costs: Intervention with proper case management and a low intensity

Figure 20 Description of the disability profiles per historic health care consumption profile for F110



5.2. Results for the historic health care consumption profiles

5.2.1. No event

- a) **The proportion of use of nursing care is significantly higher in the intervention group** for the period of six and twelve months after the inclusion. At the inclusion, 27.4% of the total intervention group had significant difficulties in performing hygiene tasks and had no nursing care. About 15% of the total intervention group had significant difficulties in hygiene tasks and had incontinence problems but received no nursing care for a total of 42% unmet needs at baseline. These unmet needs were thus reduced by half in the period of six months after the inclusion in the intervention group. In addition, nursing care was provided for 21.5% of the clients without ADL and incontinence problems which represented 8.4% of the total intervention group.
- b) **The proportion of short term institutionalization is higher in the control group** (for the period of six and twelve months after inclusion). In addition, this proportion is limited in the intervention group (only 10%). The short term institutionalization can be used to offer respite to the informal caregivers. About 19% of the clients with IADL impairment and initial cognitive problems have used this service as well as 33.9% of the clients with functional and cognitive limitations for which 86% of the informal caregivers reported a burden above the Zarit cut-off. In addition, 25% of the clients with functional, cognitive and behavioral problems for were institutionalized in short-term settings. For this clients all informal caregivers reported burden above the Zarit cut-off. The short term institutionalization can also be used after a hospitalization especially for clients with functional limitations, as it is the case for 17% of the short term institutionalization in this group. However, 25% of the short term institutionalizations were provided to clients with low limitations. These clients should not receive this type of service even after a hospitalization due to their low level of dependency. In conclusion, 75% of the short term institutionalization in the intervention group is justifiable.
- c) **The proportion of use of day care center is higher in the intervention group than in the control group** (for the period of six months after the inclusion). For the same reasons mentioned above, the use of day care center can be considered a good solution, as well as the fact that it is also recommended for people with cognitive problems. This proportion of use of day care center stays at a low level (3% in the intervention group).
- d) **On the period of six months after the inclusion, no significant difference was observed for the proportion of emergency visits and GP out-of-hours visits.** The frequency of emergency visits is significantly higher for the users of this service in the intervention group. On the period of one year before the inclusion, the proportion and the frequency of emergency visits was lower in the intervention group. The case management seems to have a long-term effect for this outcome more than a short-term effect.
- e) **The risk of death was higher in the intervention group**, which can be explain by a higher level of frailty.
- f) **The proportion of hospitalization was higher in the intervention group** for the period of six and twelve months after the inclusion. That confirms the fact that the intervention group may be frailer than the control group.
- g) **In accordance with the two previous points, the risk of institutionalization was also higher in the intervention group.** Although the intervention group may be frailer than the control group, some institutionalization should have been avoided. In fact, 6% of the clients with low

limitations, 16% of the clients with IADL limitations and initial cognitive problems and 7% of the clients with functional limitations were institutionalized in the intervention group. They represent 70% of all institutionalizations in the intervention group. The proportion of clients institutionalized is, however, highly superior for the clients who combine functional and cognitive limitations (23.7% of this impairment group) and for the clients with also behavioral problems (41.7% of this impairment group). It is also noticeable that clients with co-habitant informal caregiver are less institutionalized for a similar level of dependency than the clients with non-cohabitant informal caregiver. In addition, the burden of the informal caregivers of the institutionalized clients was above the Zarit cut-off for 57% of them. A high burden was particularly present in the group with functional and cognitive impairment (86% of the informal caregivers had a Zarit score above the cut-off) and in the group with functional, cognitive and behavioral troubles (100% of the informal caregivers had a Zarit score above the cut-off).

h) The costs for the NIHDI

- The estimated intervention cost was 114 euro in average per month per client.
- The average cost of nursing care per month per client increased more in the intervention group than in the control group (from 4 to 125 euro, at baseline, they started at the same level). The cost was higher for 20% of the clients for 6 and for 12 months in the same proportion.
- The cost of GP and specialist consultations was slightly higher in the intervention group than in the control group. This was observed for about 40% of the clients. For 12 months, the costs in the intervention group, about 20% of clients with high medical cost in the intervention group had a higher cost than in the control group.
- The cost of hospitalizations was significantly higher in the intervention group for about 20% of the clients for 6 months and slightly higher for about 30% of clients for 12 months.
- Concerning the costs at home, the total cost was higher in the intervention group: the average of 223 Euro more per month for 6 months (including also Nursing group) and 280 in the 12 months.
- When including the costs of home care, hospitalization and intervention costs, the net costs for the NIHDI were in average 411 euro per month higher for six month than in the control group (including also Nursing group). All clients in the intervention group had a higher net cost. On the period of 12 months, these costs remained higher and were 643 euro per month more than in the control group. For twelve months, all clients in the intervention group had a higher net cost.

p) For the regions:

- The cost of day care was significantly higher in the intervention group for six months 11 euro versus 1 euro in the control group on average per month). The same significant difference is observed for 12 months.
- The cost of temporary institutionalizations was significantly higher in the intervention group before intervention. This difference between treated and control significantly increased for 6 months (32 Euro versus 2 euro per month in the control group on average per month). The same difference was observed for 12 months.
- The cost of definitive institutionalizations was significantly higher in the intervention group at 6 and 12 months (54 Euro in intervention group versus 22.5 euro in the control group at six months). The same difference was observed for 12 months.

q) The costs for the clients:

- For reimbursed health care services and nursing home, the costs were not different between the two groups at 6 months and 12 months for 20% of clients.
- The cost of daycare was significantly higher in the intervention group at 6 months (3 Euro per day versus 0 Euro per month per client in the control group).
- The cost of temporary institutionalizations was significantly higher in the intervention group at 6 (30 Euro versus 3 Euro in the control on average per month) and 12 months and the difference remained stable between the 6 and 12 months.
- The cost of definitive institutionalizations was not significantly different between treated and control for 6 and was almost significantly higher in the intervention group for 12 months.

r) For all stakeholders, the net cost was significantly higher in the intervention group: + 595 Euro (by also including the group Nursing) at 6 months and + 987 at 12 months compared to the control group (for the group No event alone). These costs are higher for all clients for 6 months and 12 months.

s) For the periods of 6 and 12 months, the average number of days at home was lower before and after intervention in the intervention group: no change was observed after implementing the intervention. When adjusting for the socio-economic status and the number of days alive, 25% clients in the intervention spent less days at home for six months in the intervention group.

5.2.2. Nursing

- a) **All clients included in this group have hygiene nursing care before the inclusion.** This nursing care was justified for the majority of the clients, according to their profile in which 72.8% of the total intervention group had significant difficulties in performing hygiene tasks or combined these difficulties and incontinence problems. In the period of six months after the inclusion, the proportion of unjustified needs decreased slightly. A total of 6.7% of the intervention group still had significant difficulties in performing hygiene tasks with or without incontinence problems and no nursing care after the intervention.
- b) **No difference was observed for the short-term institutionalization.**
- c) **The proportion of day care center was 2 times higher in the intervention group** but the level of use was still low: 6.43% of the intervention group used this service.
- d) **The proportion of emergency visits was lower in the intervention group** for the period of six months after the inclusion. On the period of twelve months this difference increased up to 2.4 times higher in the control group. The frequency of use was also significantly lower in the intervention group on the period of twelve months after the inclusion.
- e) **The risk of death is higher in the intervention group**, which can be due to the fact that the intervention group was probably frailer than the control group. It is not possible to test this assumption because only IMA data is available for the control group.
- f) **No significant difference was observed for hospitalization.** According to the previous assumption, the intervention group was not more hospitalized in spite of a higher level of frailty.

The risk of institutionalization is higher in the intervention group. The dependency profile of the clients can explain the necessity to go into institutionalization. About half of the institutionalized clients had a high level of dependency. Among these clients receiving nursing care at inclusion, the proportion of institutionalized clients seems lower than in the group of clients with no event before the inclusion. That may be explained by the use of nursing care as well as by a lower number of informal caregivers with significant burden. The other half of institutionalizations could possibly have been avoided. In fact, 6.8% of the clients with low limitations, 12.7% of the clients with IADL limitation and initial cognitive impairment and 11% of the clients with functional limitations were institutionalized. However, the proportion of informal caregivers with burden (above the cut-off of the Zarit scale) was respectively for these three groups of 37.5%, 60% and 53.6%.

g) The costs for the NIHDI

- The estimated intervention cost was 131 euro per months per client.
- The average cost of nursing care was significantly higher for six months in the intervention group (578 Euro versus 489 Euro in the control group). For six months, about 25% of clients has higher nursing cost in the intervention. At 12 months, the level was lower for 50% of the clients in the intervention group.
- The cost paid for GP and specialist consultations was significantly higher in the intervention group than in the control group for 20% of the clients for 6 months and was lower for 75% of clients for 12 months.
- The cost of hospitalization was not different for six months and slightly higher for about 30% of clients for 12 months.
- The costs incurred at home were higher in the intervention group (average 223 euro per client per month less than in the control group, by including the group No event). At 12 months the costs in the intervention group were 72 euro higher (without No Event).
- When we include the costs of hospitalization and intervention, the costs were still higher in the intervention group (411 euro more for 6 months, by including the group No event and (270 higher for 12 months without No Event). For 80% of clients in the intervention group, the cost was higher than in the control for 6 and 12 months.

h) The costs for the regions

- No difference was observed between the two groups for daycare.
- The cost of temporary institutionalizations was significantly higher in the intervention group at 6 and 12 months before and after intervention. The average cost was 40 Euro per month per client for six months after intervention (17 Euro in the control group). The same difference between the two groups was observed for 12 months.
- The cost of definitive institutionalizations was significantly higher in the intervention group at 6 and 12 months. The average cost was 65 Euro for six months after intervention in the intervention group (38 Euro in the control group).

i) The costs for the clients

- For reimbursed health care services and nursing home, the costs are higher in the intervention group at 6 months and 12 months for about 20% of all clients in both periods.
- The cost of daycare was significantly higher in the intervention group (13 vs 8 Euro) for 12 months.

- The cost of temporary institutionalizations was higher in the intervention (36 vs 18 Euro) for 6 months. However, this difference was already observed before intervention.
- The cost of definitive institutionalizations was significantly higher in the intervention group for 6 months (58 vs 36 Euro).

- t) For all stakeholders, the net cost is significantly higher in the intervention group (by including the group of No Event): + 595 in six months and + 485 Euro at 12 months compared to the control group and for 12 months. These costs were significantly higher for almost all clients for 6 months and 12 months.

- u) For the periods of 6 and 12 months, the average days at home was lower for the intervention group. When adjusting for the socio-economic status and the number of days alive, the average days at home was slightly lower in the intervention group than in the control group for 12 months for 20% of the clients.

5.2.3. Hospitalization

In this group the clients had at least one episode of hospitalization in the two months before the inclusion in the projects. The clinical scales of the intervention group didn't show an important degradation at the second evaluation.

- a) **On the period of six months after the inclusion, the intervention group received significantly more nursing care.** About 54% of the intervention group had significant difficulties in the performance of hygiene tasks (36.1%) or combined these difficulties and incontinence problems (17.5%). In the period of six months after the inclusion, 49.02% of the intervention group had nursing care for only 30.39% of the control group reducing the unmet needs at 21.6% of the total intervention group. This significant difference was not found when we analyze the period of one year after the inclusion.
- b) **No significant difference was observed for short term institutionalization** during the period of six and twelve months.
- c) **On the period of twelve months after the inclusion, the proportion of day care center is nearly 2 times higher in the intervention group** but remains limited to 8% of this group.
- d) **The proportion of emergency visits is more than two times lower in the intervention group** in the period of twelve months after inclusion. No significant difference was observed on the period of six months. This results is similar as for the group "No event", showing that the effect of case management on this outcome seems to be a long-term effect.
- e) **No significant difference was shown for the proportion and the frequency of hospitalization.**
- f) **No significant difference was observed for the risk of death.** According to the proportion of hospitalization and the risk of death, we can conclude that the intervention and the control group seem to have the same level of frailty.
- g) **The risk of institutionalization is lower in the intervention group** during the period of six and twelve months after the inclusion. The number of institutionalization was lower in this group of consumption and the reason may be that clients have mainly functional limitations. The majority (81%) of the institutionalizations correspond to clients with initial or important cognitive limitation. These clients had a hospitalization in the two months before the inclusion in P3. This episode could explain the fact that the cognitive problems, even initial at that stage, have progressed. This may explain the institutionalization in the year after inclusion of 17% of

clients with IADL and initial cognitive problems and of 28.6% of clients with functional and cognitive limitations.

(This is a very interesting and relevant result because this category of clients is easily identifiable. In addition, this result is consistent with the profile of dependency of this group. Clients who mainly have functional limitations are a good target population to stay at home.)

l) The costs for the NIHDI

- The estimated intervention cost was 86 euro per months per client.
- The average cost of nursing care significantly increased in the intervention group for six months control group (112 euro in the intervention group versus 46 Euro per client per month in the control group). It remained stable between 6 and 12 months in the two groups. Both groups started at the same level but at 6 months the cost was higher for 20% of clients (the most costly clients) in the intervention group for 6 months.
- The costs incurred at home (by also including STI and Nursing, Hospi) were higher in the intervention group (average 326 euro per client per month more than in the control group). At 12 months the costs in the intervention group were 220 euro higher.
- When we include the costs of hospitalization and intervention, the costs were still higher in the intervention group for 12 months (+366 Euro per month). No significant difference was observed for six months.

m) The cost for the regions

- No difference of costs of daycare was observed.
- No difference of costs of temporary institutionalizations was observed for 6 and 12 months.
- The cost of definitive institutionalizations was significantly lower in the intervention group for six months (74 euro in the intervention group versus 219 Euro in the control group). The same significant difference was observed for twelve months.

n) The cost for the clients

- For reimbursed health care services and nursing home, the costs were slightly lower in the intervention group at 6 months for 5% of all clients.
- No difference was observed for daycare in the two groups.
- The cost of temporary stays in nursing home was not significantly different.
- The cost of definitive institutionalizations was significantly lower in the intervention group (78 versus 248 Euro).

o) For all stakeholders, the net cost was not significantly different between the two groups (by also including STI and Nursing, Hospi).

p) For the periods of 6 and 12 months, there was no difference on the average days at home.

5.2.4. Short term institutionalization

a) The proportion of use of nursing care was significantly higher in the intervention group on the period of six and twelve months after the inclusion. This difference is very large (more than 80% of the intervention group for only 34% of the control group) but justified. At the inclusion, 83.3% of clients with significant difficulties in the performance of hygiene tasks and 27.3% of

the clients who combined these difficulties with incontinence problems did not receive nursing care, which is a total of 42.1% unmet needs. In the period of six months after the inclusion, the proportion of unmet needs of nursing care was 10.6% in the intervention group. In addition, only 2.6% of the total intervention group received unjustified nursing care.

- b) **No significant difference was observed for the frequency of short term institutionalization** on the period of six and twelve months. However, the proportion of utilization was higher than in the control group between the users. That can be interpreted by the fact that it is easier to use this service when this service has been already used and known.
- c) **The proportion of day care was not interpretable due to the small number of clients.**
- d) **The proportion of emergency visits was lower in the intervention group** and this difference was significant during the period of twelve months after the inclusion.
- e) **No significant difference was observed for the hospitalization rates.**
- f) **No significant difference was observed on the risk of death.**
- g) **The risk of institutionalization is significantly lower in the intervention group** on the period of six months after the inclusion. This difference was not observed at twelve months. The risk of institutionalization was almost 2 times higher when the clients used short-term institutionalization before the inclusion. Considering, the heavy profile of dependency of these clients, only home adaptations are not effective. In the intervention group, 50% of the clients with IADL and initial cognitive problems; 20% of the clients with only functional limitations and 23.1% of the clients with functional and cognitive limitations were institutionalized. For all these profiles of dependency, more than a half of the informal caregivers had a burden score above the Zarit cut-off.

- q) **The costs for the NIHDI:**
 - The estimated intervention cost was 247 euro per months per client.
 - The average cost of nursing care increased significantly for 6 months (582 Euro in the intervention group versus 189 Euro in the control group) and remained higher for 12 months. The level of nursing costs in the intervention group was higher for 6 months for about 60% of clients and for 50% of clients for 12 months.
 - The cost paid for GP and specialist consultations was slightly higher in the intervention group than in the control group for 80% of the clients at 6 months. No significant difference was observed for 12 months.
 - The costs incurred at home (by also including STI and Nursing, Hospi) were higher in the intervention group (average 326 euro per client per month more than in the control group). At 12 months the costs in the intervention group were 220 euro higher.
 - When we include the costs of hospitalization and intervention, the costs were still higher in the intervention group for 12 months (+366 Euro per month). For 50% of clients, the total cost is higher in the intervention group for 12 months. No significant difference was observed for six months.

- r) **The costs for the regions**
 - No difference was observed for daycare.
 - The costs of temporary institutionalizations in the intervention group did not differ from the control group.
 - The cost of definitive institutionalizations was significantly lower in the intervention group at 6 (94 versus 462 Euro) and 12 months.

s) For the clients and informal carers:

- For reimbursed health care services, the costs are lower in the intervention group at 6 months for almost 50% of all clients. For 12 months, the costs are still lower a small proportion of clients in the intervention group.
- The costs of temporary institutionalizations were significantly lower in the intervention group for the period of 6 months and 12 months (74 euro in the intervention group versus 197 Euro in the intervention group for six months).
- The costs of definitive institutionalizations were significantly lower at 6 and 12 months (82 Euro per month in the intervention group, versus 546 Euro in the control group for six months).

t) For all stakeholders, the net cost was no significantly different between the two groups (by also including Hospi and Nursing, Hospi).

h) For the periods of 6 and 12 months, the average days at home wasnot different in the two groups.

5.2.5. Nursing and hospitalization

- a) **The nursing care were justified for the majority of the intervention group** as 77% of the clients had significant difficulties in the performance of hygiene tasks (33%) or combined these difficulties with incontinence problems (44%). Only 8.3% of the total intervention group received nursing care and didn't have ADL or incontinence problems. On the period of six months after the inclusion, 10.1% of the clients with significant difficulties in the performance of hygiene tasks with or without incontinence problems stopped with nursing care. No difference of proportion of nursing care was observed in the control group.
- b) **No difference was observed for the short term institutionalization.**
- c) **No difference was observed for the use of day care centers.**
- d) **The proportion of emergency visits was significantly lower in the intervention group** on the period of six and twelve months after the inclusion. About 59% of the control group used the emergency services on the period of twelve months after the inclusion for only 22.52% of the intervention group. In addition, the users in the intervention group returned less frequently to the emergency department than the users in the control group.
- e) **The proportion of hospitalization was lower in the intervention group** during the period of six and twelve months. The frequency of hospitalization was also lower among the users in the intervention group.
- f) **The risk of death in higher in the control group during the period of six and twelve months.** The control group was potentially frailer than the intervention group. It is not possible to confirm this assumption, but it can explain the difference in hospitalization rates.
- g) **No difference was observed on the risk of institutionalization.** The proportion of clients with low limitation (12% of this group) or functional limitations (11% of this group) who were institutionalized was higher in this group of consumption. That can be explained by the complexity of the history of health care consumption. In fact, these clients received nursing care but also stayed in a hospital previously, sometimes with multiple stays. The clients with cognitive problems were, nevertheless, more institutionalized than the other clients with

23.1% of the clients with IADL and initial cognitive problems, 19.4% of the clients with cognitive and functional limitations, and 50% of the clients with additional behavioral troubles.

h) For the NIHDI

- The estimated intervention cost was 104 euro per months per client.
- The average cost of nursing care increased in the two groups. No difference was observed in the two groups. The cost was 549 euro in the intervention group and 511 euro in the control group for the period of 6 months.
- The cost of hospitalizations was slightly lower in the intervention group for about 10% of clients for 6 months but no significant difference was observed for 12 months.
- The costs incurred at home (by also including Hospi and STI) were higher in the intervention group (average 326 euro per client per month more than in the control group). At 12 months the costs in the intervention group were 220 euro higher.
- When we include the costs of hospitalization and intervention (by also including Hospi and STI), the costs were still higher in the intervention group for 12 months (+366 Euro per month). No significant difference was observed for six months.

i) For the regions

- No difference was observed for daycare.
- No difference was observed for temporary institutionalizations
- The cost of definitive institutionalizations was significantly higher in the intervention group for 6 months (134 Euro versus 53 Euro) and for 12 months (184 versus 84 euro).

u) For the clients

- Concerning the reimbursed health care services and nursing home, no difference of cost between the two groups was observed.
- No difference was observed for daycare.
- No difference was observed for temporary institutionalizations.
- Concerning the reimbursed health care services and nursing home, no difference of the total cost between the two groups was observed.
- The difference of costs of definitive institutionalizations was significantly higher in the control group for the period of 6 months (113 Euro in the intervention group versus 41 Euro in the control group, per month, per client). For 12 months, the same difference was observed.

v) For all stakeholders, the net cost was not significantly different between the two groups (by also including Hospi and Nursing, Hospi).

v) For the periods of 6 and 12 months, after adjusting for the socio-economic status and the number of days alive, there was no difference for 6 months nor for 12 months.

6. Results of the effectiveness and the costs: Intervention with proper case management and a high intensity F1P011

6.1. Description of the target population

6.1.1. Disability profiles

Description of disability profiles

The beneficiaries of interventions with a proper case management, without psychological support and with a high intensity were clustered in five disability profiles:

- **Clients with low limitations:** low functional and cognitive impairments but 20% of this group had a score on the DRS scales above the cut-off. These clients suffered from significant depressive symptoms.
- **Clients with IADL difficulties and initial cognitive impairments:** 95% of this group had a score of IADL scale above the IADL cut-off which means important difficulties on IADL tasks. Only 6% of this group had a score on CPS scale above the CPS cut-off which means important cognitive impairment. However, at least a quarter of this group presented initial cognitive impairments with a CPS score of 1 or 2 on a 6-point scale.
- **Clients with functional limitations:** 94% and 98% of this group had respectively a score of IADL and ADL scales above the cut-off of these scales. This means that these clients had significant functional limitations. The cognitive impairment was limited in this group with 75% of the clients with a score of 0 on the CPS scales and any CPS score above the CPS cut-off.
- **Clients with functional and cognitive impairments :** the clients in this group combined functional (with respectively 100% and 78% of the clients with a score on the IADL and ADL scales above the cut-off of these scales) , cognitive impairments (98% of the clients with a score on the CPS scale above the cut-off of this scale)
- **Clients with functional and cognitive impairments and in addition behavioral problems:** : the clients in this group combined functional (with respectively 98% and 75% of the clients with a score on the IADL and ADL scales above the cut-off of these scales) , cognitive impairments (94% of the clients with a score on the CPS scale above the cut-off of this scale) , behavioral problems (100% of the clients had at least one behavioral problem), and depressive symptoms (50% of clients had a DRS score above the cut-off).

Description of socio-demographic characteristics

There are no significant differences for age and gender between the intervention group and the control group. However, in all clusters the control group shows a higher percentage of clients in the high median income groups. This means that the control group has a higher proportion of people in the higher income groups according to the region distribution of frail older people.

Chapter 4 Results of case management interventions

6 Results of the effectiveness and the costs: Intervention with proper case management and a high intensity F1P011

Table 12 Sociodemographic characteristics per disability profile for F1P011

	low limit.		IADL, (cogn.)		func.		func., cogn.		func., cogn., behav.	
	T	C	T	C	T	C	T	C	T	C
Age										
Median[IQR]	82[76-86]	81[77-87]	81[76-85]	81[75-87]	81[76-85]	84[79-88]	82[76-86]	82[78-88]	80[70-84]	81[72-88]
Gender										
% Men	33.09	23.64	21.57	25.65	23.29	24.43	36.33	29.39	32.69	32.69
% Women	66.91	76.36	78.43	74.35	76.71	75.57	63.67	70.61	67.31	67.31
ICG										
% No ICG	18.18	18.18	5.57	5.57	8	8	0.41	0	0	0
% No cohabitant	69.45	69.45	79.03	79.13	64.57	64.57	44.49	44.9	34.62	34.62
% Cohabitant	12.36	12.36	15.41	15.31	27.43	27.43	55.1	55.1	65.38	65.38
Region										
Bruxelles	0.36	0	0.1	0	0	0	0	0	0	0
Flandre	69.82	54.55	89.86	55.77	84.14	86.14	73.88	77.96	76.92	46.15
Wallonie	29.82	45.45	10.04	44.23	15.86	13.86	26.12	22.04	23.08	53.85
Median income										
Low	17.82	25.82	6.66	34.99	9.43	10.43	14.69	6.94	11.54	44.23
Medium	62.55	47.64	79.32	41.75	68.71	54	55.92	49.8	51.92	46.15
High	19.64	26.55	14.02	23.26	21.86	35.57	29.39	43.27	36.54	9.62
N										
Unique value	275	59	1006	114	700	205	245	84	52	18

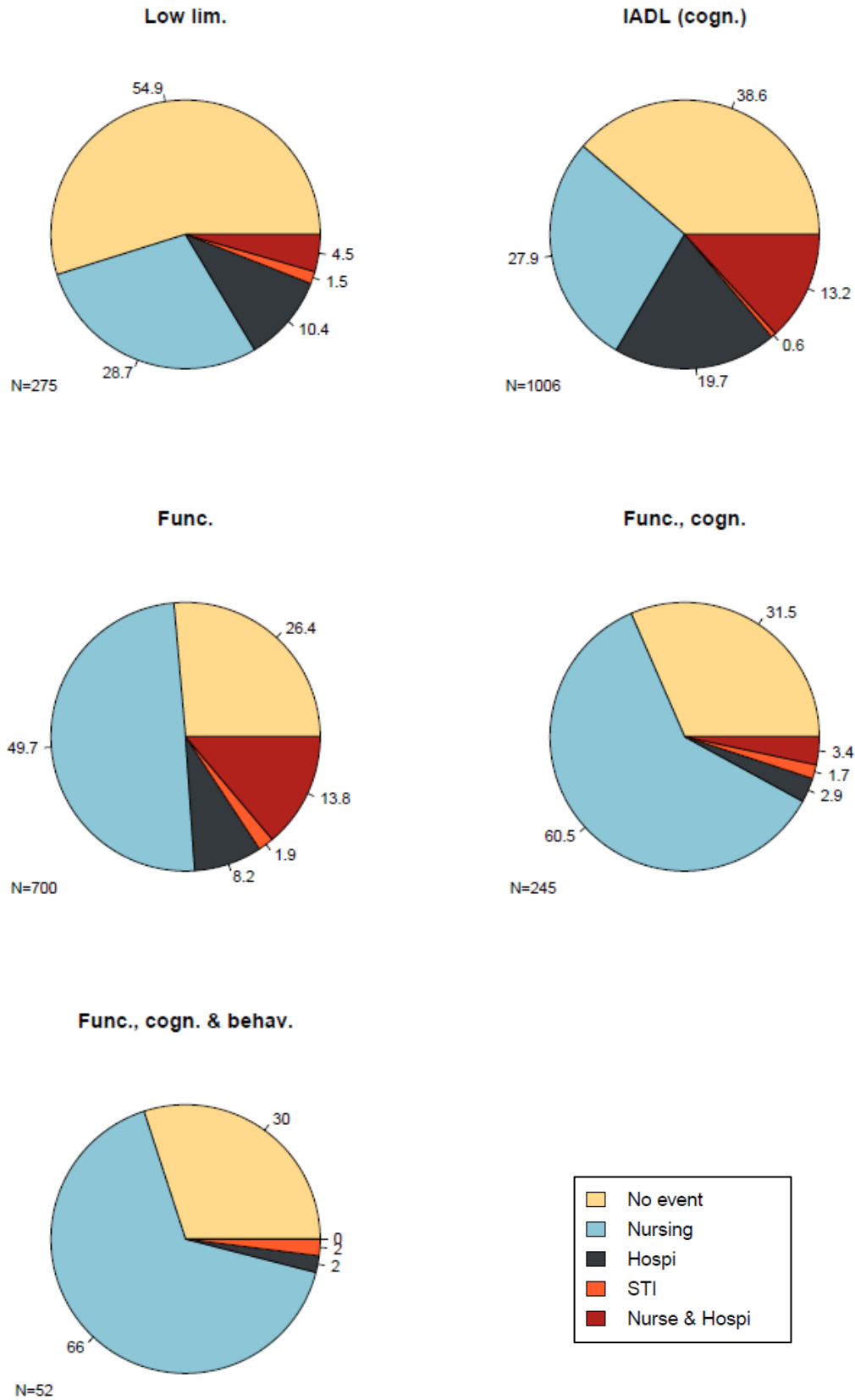
The figure hereafter presents the key previous healthcare utilization pattern of population grouped by disability profiles. Following characteristics may be highlighted:

- The clients with IADL limitations and initial cognitive impairments in this intervention were for 33% hospitalized before the inclusion. This proportion is high compared to the others interventions. These clients can be in an acute situation with a higher risk of deterioration.
- The unmet need of nursing care was limited at the inclusion. The clients combining functional, cognitive and behavioural troubles are clients with significant unmet of nursing care need but in this intervention group, 64% had nursing care at the inclusion.
- The proportion of clients using the short-term institutionalization is low at the inclusion in this intervention.

Chapter 4 Results of case management interventions

6 Results of the effectiveness and the costs: Intervention with proper case management and a high intensity F1P0I1

Figure 21 Description of the historic health care consumption profile per disability profile for F1P0I1



6.2. Results for the disability profiles

6.2.1. Low limitations

- a) **Limited improvement of the functional limitations.** The results show a significant improvement of IADL for about 40% of the clients. This applies for people with IADL scores lower than 10 or between 22 and 24. No significant difference was found for ADL, but a significant decrease was found for the frequency of falls. This means that case management F1P0I1 is associated with a lower risk of falls than the control group,
- b) A slight improvement of the quality of life was observed for 15% of the clients with a score around 22. However for the clients with a score above 28 the quality of life was lower in the intervention group.
- c) **No difference was observed on the depressive symptoms.**
- d) **An increase of the burden.** This type of case management seems to be associated with higher burden of the informal caregiver (co-habitant or not).
- e) **No significant difference for the use of nursing care.**
- f) **A significant difference on the emergency visits.**
- g) **An increase in the frequency and the proportion of GP out-of-hours visits and hospitalizations**
- h) **No difference was found for institutionalization or death (no deaths occurred).**
- i) **The cost for the NIHDI**
 - The estimated intervention cost was 170 euro per months per client.
 - The average cost of nursing care per month per client has increased in the intervention group (from 76 euro to 184 euro). However, the average cost was significantly lower in the intervention group after six months with an average of 531 euro but the difference of costs between intervention and control groups was not significant after adjustment with the cost before intervention: i.e. the higher level of cost observed before intervention in the control group was still observed after intervention.
 - The total medical cost (GP and specialist consultations) was lower in the intervention group for about 80% of the clients.
 - The cost of hospitalizations was higher in the intervention group only for 30% of the clients with the highest costs.
 - The total net cost (including at home, intervention and hospitalizations) was higher in the intervention group (average 368 euro per client per month less than in the control).
- j) **The cost for the regions**
 - There was no difference between the two groups for daycare costs.
 - The cost of temporary institutionalizations was significantly higher in the intervention group for six months after intervention (19 Euro versus 1 Euro per month).
 - The cost of definitive institutionalizations was significantly lower in the intervention group (16 Euro versus 52 Euro).
- k) **The cost for the clients and informal carers**
 - The total cost of reimbursed health care and nursing home was significantly higher in the intervention for 20% of clients.

- The monthly cost of daycare was not different in the two groups.
 - The cost of temporary institutionalizations was higher in the intervention group (23 Euro versus 0.6 Euro per month).
 - The cost of definitive institutionalizations was significantly lower in the intervention group (15 in the intervention group and 60 in the control group).
 - The informal care cost did not change in the two groups.
 - The household aid cost significantly increased in the intervention group and remained significantly higher than in the control group as at baseline.
 - The cost of meals-on wheels did not change in the two groups.
- l) For all stakeholders**, the total net cost was on average 295 euro higher in the intervention group.
- m) For about 40% of clients, there was a difference for the total days spent at home:** clients in the intervention group stayed slightly less at home than clients in the control group.

6.2.2. IADL impairment (with or without some cognitive problems)

- a) A significant improvement on the functional limitations.** Case management F1P0I1 was associated with a large improvement of IADL and ADL performance of clients in this cluster. About 80% of the clients show an improvement for IADL (up to 13 points on a scale of 48) and 65% show an improvement in ADL performance (up to 2 points on a scale of 6). After adjustment for the difference before, the score of the 30% of clients with the higher depressive score are significantly higher in the control group. A trend improvement can be observed for the risk of falls in the intervention group. The proportion of clients above the cut-off is not significant different but the depressive symptoms are low in the intervention group (9% of the intervention group above the cut-off at the first and the second evaluation).
- b) Significant improvement of the burden of the non-cohabitant informal caregiver with a high burden at the second evaluation.** Case management F1P0I1 is associated with a significant decrease in burden of informal caregivers who do not live with the frail older person. The higher the burden, the larger the decrease. This significant decrease concerns 50% of the informal caregivers and goes up to 10 points on a scale of 48. For co-habitants the burden increases at very low levels of the scale (lower than 5).
- c) The quality of life is improved.** The results for the quality of life scores show that this case management is very effective at improving quality of life of clients in this cluster. The results show an improvement of quality of life for the whole population in the intervention cluster in comparison with the control group between 2 to 5 points on a scale of 66. The significant decrease of functional limitations can explain the improvement of the depressive scores, the quality of life and the burden of ICG. Especially the burden of the non-cohabitant who are less involved in IADL tasks.
- d) The proportion of use of nursing care is lower than in the intervention group.** The unmet need was about 18% of the intervention group and 8% of the control at the inclusion and decrease to respectively 11 and 1% during the period of six months after the inclusion. The proportion of nursing care for clients with no hygiene tasks and incontinence limitations were about 3% in the intervention group and about 6% in the control group.
- e) Slight decrease in emergency visits and GP out-of-hours visits.**

- f) There is an **increase in the proportion and frequency of hospitalization** in comparison with the control group.
- g) **No difference on institutionalization. Death risk is higher in control group.**
- h) **The costs for the NIHDI**
- The intervention cost estimated was 169 euro per months per client.
 - The average cost of nursing care increased in the intervention group (from 110 to 232 euro). However, for all clients, the average cost per month was still significantly higher in the control group after six months (911 euro per month). For 20% of the clients, the difference was very high (from the clients above 1200 euro per month in the intervention group, the maximum difference observed was about 900 Euro).
 - The cost paid for GP and specialist consultations was significantly lower in the intervention group than in the control group for all clients.
 - The adjusted net costs incurred at home was lower in the intervention group, in average, -345 euro per client per month.
 - Adding hospitalization and intervention costs, the total net costs was still lower in the intervention group (-145 euro less), but this difference was not significant.
- i) **For the regions**
- Daycare costs did not change in the two groups.
 - The cost of temporary institutionalizations was significantly higher in the intervention group for six months after intervention (47 Euro versus 11 Euro per month).
 - The cost of definitive institutionalizations was not significantly different in the two groups. This cost was 83 euros in the intervention group and 70 euros per client per month in the control group.
- j) **For the clients and informal carers**
- For reimbursed health care services, overall, there was no difference on the total cost between treated and controls.
 - The cost of temporary institutionalizations was significantly higher in the intervention group for six months after intervention (45 Euro versus 14 Euro per month).
 - The cost of definitive institutionalizations was not significantly different in the two groups.
 - There was no difference on the informal care cost between treated and control and no change are observed after intervention.
 - Household aid cost significantly increased in the intervention group but was not significantly higher than in the control group
 - No difference on the cost of meals-on wheels was observed.
- k) For all stakeholders, there was no significant difference between the intervention group and control group.
- l) The total number of days spent at home was slightly lower in the control group for about 15% of the clients.

6.2.3. Functional (IADL & ADL impairment)

- a) **Significant improvement of the functional limitations.** We observe a significant improvement for IADL, decreasing the impairment for almost 50% of the clients in the intervention group with IADL score lower than 33 compared to the control group and until 15 points on a scale of 48. We show a significant decrease of the frequency of the falls in the intervention group. We also notice a major decrease of the proportion of clients above the ADL cut-off in the intervention group (97.95% of the clients in the first evaluation decrease to 59.02% at the second evaluation). This decrease was not observed in the control group.
- b) **An improvement of the informal caregiver's burden and quality of life of clients.** Case management FIP010 is slightly associated with less burden of the informal caregiver non-cohabitant from a value of the Zarit-scale of 12. However, the proportion of burden in the cohabitants is higher in the intervention group than in the control group. The functional improvement is the most important for clients of the group with the less important limitations. These clients are mainly in the category of clients with a non-cohabitant informal caregiver. That can explain why the improvement of the Zarit was only observed for the non-cohabitants.
- c) **The proportion of clients with significant depressive symptoms remains stable** in the intervention group while she increase in the control group.
- d) In addition, **an improvement of the perceived quality of life was observed for 80%** of clients in comparison with the control group.
- e) **The proportion of nursing care is significantly lower in the intervention group.** This can be explained by the major decrease of the ADL limitations in the intervention group. There are nevertheless more unmet needs in nursing care since in the intervention group 10.2% of clients with ADL limitations and incontinence problems and 29% of clients with ADL limitations and without incontinence remain without nursing care (a total of 8% of the intervention group). In the control group these unmet needs are limited at 1.9% of the total group.
- f) **The risk of institutionalization, the risk of death, the proportion and the frequency of hospitalization and the proportion of emergency visits are significantly higher in the intervention group.** We can do the hypothesis that the group intervention in spite of the matching on the different BelRAI scales is frailer than the control group. It is possible for the matched clients to have the same dependency level but with different health histories (ex. acute problems). This is a limitation of the matching since clients are matched using variables about their level of dependency and not using variables about their consumption of services. The consumption could give an idea of their health stability and this was not performed here.
- g) **Significant decrease of the frequency of emergency visits and of the frequency of GP out-of-hours visits** among the clients who use these services. We make the assumption that the intervention group is frailer than the control group and that they have more use of certain services. The intervention, on the other hand, reduces the repetitions of use of these services and this is a very good result for these clients.
- h) **The costs for the NIHDI**
 - The intervention cost estimated is 158 euro per months per client.
 - The average cost of nursing care has increased in the intervention group from 206 to 364 euro but these costs remained much higher in the control group for all the clients (average of 1297 euros in the control group). The difference varies from 200 euro per month up to about 800 euro.

- The cost paid for GP and specialist consultations was lower in the intervention group than in the control group for all clients in this cluster.
 - The cost of hospitalizations was higher in the intervention group for about 40% of the clients.
 - The costs incurred at home (NIHDI) are lower in the intervention group (average 425 euro per client per month less than in the control group. When we include the costs of hospitalization and intervention, the difference of costs was not significant between intervention and control.
- i) The costs for the regions**
- The cost of temporary institutionalizations was significantly higher in the intervention group (48 vs 12 euro).
 - The cost of definitive institutionalizations was significantly higher in the intervention group (48 Euro versus 7 Euro per month).
- j) The costs for the clients and informal carers**
- The total cost of reimbursed health care services and nursing home was higher for all clients in the intervention group.
 - Daycare costs did not change in the two groups.
 - The cost of temporary institutionalizations was significantly higher in the intervention group for six months after intervention (66 Euro versus 18 Euro per month).
 - The cost of definitive institutionalizations was significantly higher in the intervention group (40 Euro versus 9 Euro).
 - There was no difference on informal care cost between treated and control and no change are observed after intervention.
 - Household aid cost significantly increased in the intervention group but was not significantly different than in the control group at six month after intervention.
 - No difference on the cost of meals-on wheels was observed.
- k) For all stakeholders, the total net cost of health care services and nursing home was higher in the intervention group (+244 euros per month per client).**
- l) The total number of days spent at home was slightly lower in the control group for about 15% of the clients.**

6.2.4. Functional and cognitive problems (ADL, CPS)

- a) Improvement of the functional limitations.** An improvement of ADL limitations was observed after adjustment for the difference before. In despite of the adjustment, it is important to notice that there less clients above the ADL cut-off in the intervention group than in the control group at the inclusion. A significant improvement was shown on IADL impairment for people with IADL score lower than 38 which represents 25% of the intervention group.
- b) Improvement of the quality of life.** In addition there was a significant decrease of the **depressive symptoms** (for the 30% of the clients least depressed) and slight improving perceived quality of life (up to 2.5 point on a scale of 66 for the 25% of the clients having a score below 25).
- c) No significant difference was observed for the burden of the cohabitant informal caregivers. For non-cohabitants, an increase (up to 10 points on a scale of 48) of the burden for the 25%**

of the clients having the highest burden was observed. The case management F1P0I1 seem more efficient for clients having yet a potential for improvement in their functional limitations.

- d) Still unmet needs for nursing care.** About 13% of clients with significant ADL limitation and significant incontinence and 32.3% of clients with ADL limitation without incontinence do not receive nursing care. That represents 15.8% of the total intervention group. In the control group these proportions are respectively 1.6% and 0% which represent 1.2% of the total control group. Some nursing care is provided to clients without ADL limitation or incontinence (respectively 1.2% of the total intervention group and 2.5% of the total control group).
- e) More utilization of day care centers in the intervention group.** The frequency of utilization of day-care centers is significantly higher in the intervention group which is justified for this group (cognitive problems). This difference is not due to a regional difference.
- f) More inappropriate use of services in the intervention group.** The intervention is also associated with a larger proportion and frequency of emergency visits and hospitalization. The proportion of visits to the GP out-of-hours is also increased in the intervention group in comparison with the control group.
- g) No difference on the risk of institutionalization but the risk of death is higher in the intervention group.** The risk of institutionalization is not significant different between intervention and control group. The risk of death is significant higher in the intervention group which can explain the significant increase of the use of inappropriate services (emergency, hospitalization).
- h) The costs for the NIHDI**
- The intervention cost estimated was 166 euro per months per client.
 - The average cost of nursing care increased in the intervention group from 418 to 859 euro. Despite of this increase, the nursing costs are higher at baseline and increased more in the control group as well. The difference of nursing costs for 6 months was significant for 90% (maximum difference of about 600 Euro).
 - The total medical cost paid for GP and specialist consultations was lower in the intervention group than in the control group for all clients in this cluster.
 - The cost of hospitalization was higher in the intervention group but this was only observed for about 20% of the clients.
 - For all clients, the total net cost was not significantly different in the intervention group.
 - The costs incurred at home were lower in the intervention group (average 516 euro per client per month less than in the control group). The total net cost per client (at home, the cost of intervention and hospitalizations) was significantly lower in the intervention group for all clients (-411 euro).
- i) The costs for the regions**
- Daycare costs were significantly higher in the intervention group (average cost of 32 versus 6).
 - The cost of temporary institutionalizations was significantly higher in the intervention group (average cost of 49 versus 19 euro per month).
 - The cost of definitive institutionalizations was not different between the two groups. The average monthly costs were 102 euro per client in the intervention group.
- a) The costs for the clients and informal carers**

- The total cost of reimbursed health care services and nursing home was higher for almost 20% of the clients in the intervention group.
 - Daycare costs were significantly higher in the intervention group (average cost of 11 versus 1) but the same difference was observed before.
 - The cost of temporary institutionalizations was higher in the intervention group (average of 43 versus 19 Euro).
 - The cost of definitive institutionalizations was not different.
 - There was no difference on informal care cost between treated and control and no change are observed after intervention.
 - Household aid cost did not change in the two groups.
 - No difference on the cost of meals-on wheels was observed.
- j) **The cost for all stakeholders**, the net cost of health care services and nursing home was not different between the two groups.
- k) The total number of days spent at home was lower in the intervention group for 10% of clients.

6.2.5. Functional and cognitive problems (ADL, CPS and also behavior group)

- a) **Slight deterioration of functional outcomes.** Case management F1P0I1 is associated with a significant increase of IADL impairment for people with IADL score above 45 which represent less than 10% of the intervention group and a slight increase in ADL impairment for people with score above 4. No difference was found for the incidence of falls.
- b) **Limited improvement of the informal caregiver's burden, no difference of depressive status and no difference of quality of life of clients.** A small but significant decrease of the Zarit was observed for the 15% of the cohabitant ICG in the intervention group who had at a low burden (under 10).
- c) **Still unmet needs for nursing care** The unmet needs in nursing care are important in the intervention and the control group. About 21% of clients with important ADL limitations and incontinence problems (20% in the control group) and 14.8% with ADL limitations without incontinence problems (0% in control group) receive no nursing care (11.8% of the total intervention group – 13.7% in the control group).
- d) **More visits to day care centers but no difference on other services.** No difference was found for the emergency visits, the visits to the GP out-of-hours or on hospitalization.
- e) **The risk of institutionalization is significant higher in the intervention group.** This population is typically the right target population for institutionalization. Therefore, we can consider that the intervention targeted people effectively into institutionalization. In addition, case management F1P0I1 is associated with a higher incidence of death in comparison with the control group.
- l) **The costs for the NIHDI**
- The intervention cost estimated was 160 euro per months per client.
 - The average cost of nursing care increased in the intervention group from 396 to 786 euro (750 euro to 1567 euro in the control group). The nursing costs remained lower in the intervention group in the period of 6 months for almost 80% of the clients.

- The total medical cost (GP and specialist consultations) was lower in the intervention group for all clients in this cluster.
- The costs incurred at home were lower in the intervention group (average 492 euro per client per month less than in the control group). The total net cost (at home, intervention and hospitalizations) was not different from the control group.

m) The costs for the regions

- The monthly cost of daycare was higher in the intervention group (87 vs 17).
- The difference of the cost of temporary institutionalizations was not significant.
- The difference of the cost of definitive institutionalizations was higher in the intervention group (156 vs 12 Euro).

n) The costs for the clients and informal carers

- Daycare costs were not different between the two groups.
- The cost of temporary institutionalizations was not different between the two groups.
- The cost of definitive institutionalizations was significantly higher in the intervention group (average cost of 124 versus 14 Euro per month)
- There was no difference on informal care cost between treated and control and no change are observed after intervention.
- Household aid cost did not change in the two groups and no difference was observed.
- No difference on the cost of meals-on wheels was observed.
- There was no difference on informal care cost between treated and control and no change are observed after intervention.
- Household aid cost did not change in the two groups and no difference was observed.
- No difference on the cost of meals-on wheels was observed.

o) For all stakeholders, the net cost of health care services and nursing home was not different between the two groups.

p) The total number of days spent at home was lower in the control group for about 40% of the clients.

7. Results of the effectiveness and the costs: Intervention with proper case management, with proper psychological support and a high intensity F1P1I1

7.1. Description of the target population

7.1.1. Disability profiles

Description of disability profiles

The beneficiaries of interventions with a proper case management, without psychological support and with a high intensity were clustered in five disability profiles:

- **Clients with low limitations:** low functional and cognitive impairments but 32% of this group had a score on the DRS scales above the cut-off. These clients suffered from significant depressive symptoms.
- **Clients with IADL difficulties and initial cognitive impairments:** 92% of this group had a score of IADL scale above the IADL cut-off which means important difficulties on IADL tasks. 23% of this group had a score on CPS scale above the CPS cut-off which means important cognitive impairment. However, over half of this group presented initial cognitive impairments with a CPS score of 1 or 2 on a 6-point scale.
- **Clients with functional limitations:** 89% and 99% of this group had respectively a score of IADL and ADL scales above the cut-off of these scales. This means that these clients had significant functional limitations. The cognitive impairment was limited in this group with 75% of the clients with a score of 0 on the CPS scales and any CPS score above the CPS cut-off.
- **Clients with functional and cognitive impairments :** the clients in this group combined functional (with respectively 99% and 76% of the clients with a score on the IADL and ADL scales above the cut-off of these scales) , cognitive impairments (95% of the clients with a score on the CPS scale above the cut-off of this scale)
- **Clients with functional and cognitive impairments and in addition behavioral problems:** : the clients in this group combined functional (with respectively 98% and 51% of the clients with a score on the IADL and ADL scales above the cut-off of these scales) , cognitive impairments (95% of the clients with a score on the CPS scale above the cut-off of this scale) , behavioral problems (100% of the clients had at least one behavioral problem), and depressive symptoms (61% of clients had a DRS score above the cut-off).

Description of socio-demographic characteristics

There are significant differences for age and gender between the intervention group and the control group for the cluster functional and the cluster functional, cognitive and behavior problems. The main differences in median incomes can be found in the clusters IADL and cognition, functional cluster and functional and cognitive impairment. In these clusters, the control group has a higher median income than the intervention group. This means that the control group has a higher proportion of people in the higher income region than the intervention group.

Chapter 4 Results of case management interventions

7 Results of the effectiveness and the costs: Intervention with proper case management, with proper psychological support and a high intensity F1P111

Table 13 Sociodemographic variables for each disability profile for F1P111

	low limit.		IADL, (cogn.)		func.		func., cogn.		func., cogn., behav.	
	T	C	T	C	T	C	T	C	T	C
Age										
Median[IQR]	79[74-82]	81[77-87]	80[75-86]	81[74-87]	81[76-86]	83[79-88]	83[77-87]	85[80-87]	78[71-83]	80[70-87]
Gender										
% Men	29.63	19.66	28.9	30.23	25.23	34.83	31.52	29.09	53.12	42.19
% Women	70.37	80.34	71.1	69.77	74.77	65.17	68.48	70.91	46.88	57.81
ICG										
% No ICG	49.57	50.14	31.89	31.89	45.35	45.35	0	0	0	0
% No cohabitant	30.77	30.2	36.54	36.54	35.74	35.74	43.64	43.64	20.31	20.31
% Cohabitant	19.66	19.66	31.56	31.56	18.92	18.92	56.36	56.36	79.69	79.69
Region										
Bruxelles	19.94	0	17.28	0	5.41	0	12.12	0	7.81	0
Flandre	63.25	43.02	66.11	32.89	91.29	85.59	62.42	81.82	62.5	43.75
Wallonie	16.81	56.98	16.61	67.11	3.3	14.41	25.45	18.18	29.69	56.25
Median income										
Low	28.21	23.65	30.23	52.49	19.82	14.41	29.7	6.06	21.88	42.19
Medium	55.56	52.42	49.17	30.23	60.06	51.95	55.15	53.33	68.75	32.81
High	16.24	23.93	20.6	17.28	20.12	33.63	15.15	40.61	9.38	25
N										
Unique value	351	60	301	91	333	135	165	66	64	18

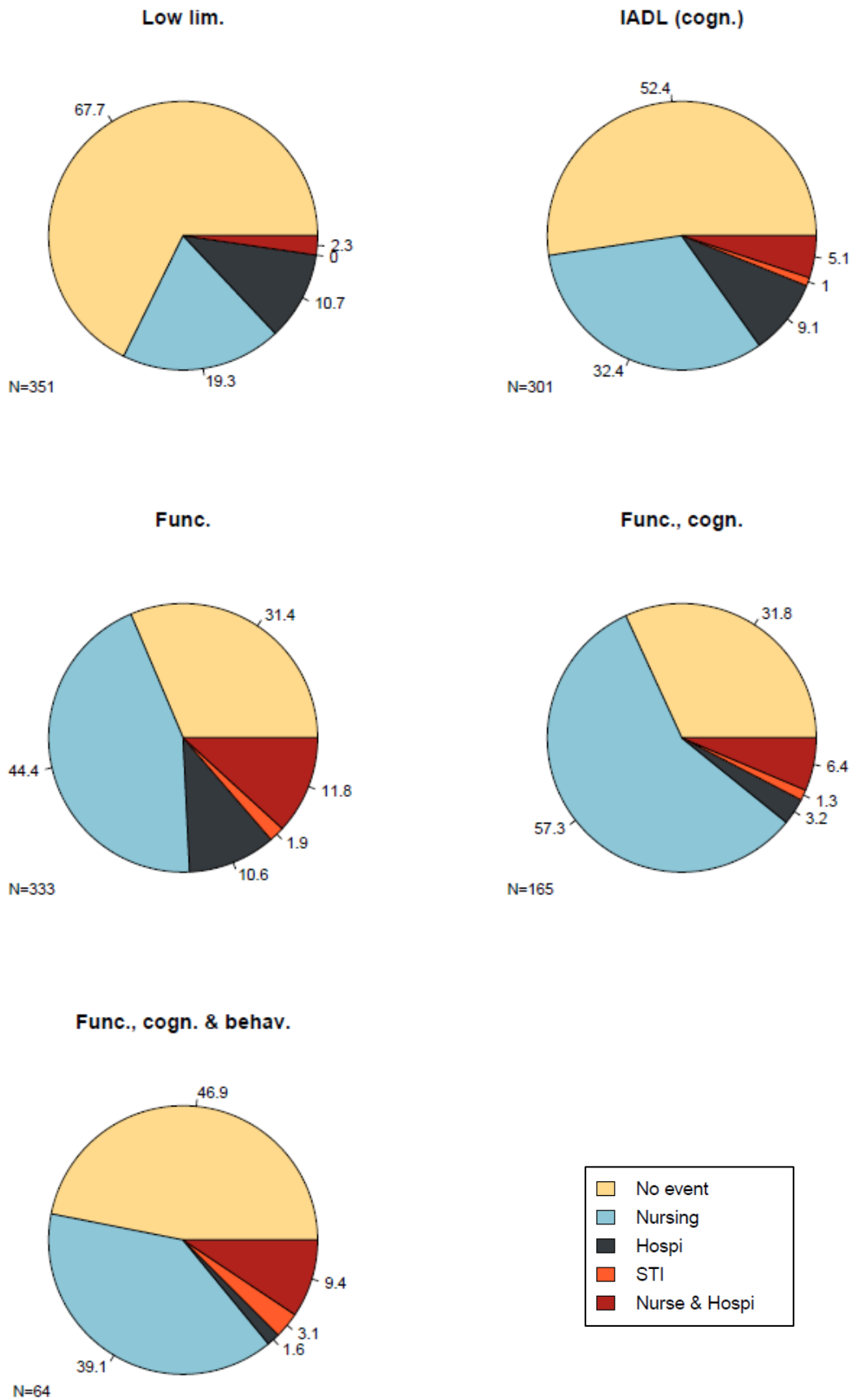
The figure hereafter presents the key previous healthcare utilization pattern of population grouped by disability profiles. Following characteristics may be highlighted:

- The unmet need of nursing care was high at the inclusion, especially for clients combining functional, cognitive and behavioural troubles. Indeed, only 48% of these clients had nursing care at the inclusion.
- The proportion of clients using the short-term institutionalization is low at the inclusion in this intervention.

Chapter 4 Results of case management interventions

7 Results of the effectiveness and the costs: Intervention with proper case management, with proper psychological support and a high intensity F1P111

Figure 22 Description of the historic health care consumption profile per disability profile for F1P111



7.2. Results for the disability profiles

7.2.1. Low limitations

- a) **Limited improvement on the functional limitations.** The results show that case management F1P111 has a significant effect at improving IADL for people with very low IADL scores at the second evaluation (around the value of 6). This improvement is limited to 2 points in a scale of 24 for 15% of the clients in this cluster. The ADL performance in this cluster has also a limited effect of improvement but this is expected since only a low percentage of clients have ADL limitations.
- b) **A decrease of the frequency and the proportion of the risk of falls was observed.**
- c) **Better perceived quality of life but higher burden for co-habitants.** Although the intervention offers psychological support, no difference was found on the depression rates. However, the perceived quality of life of clients shows a significant improvement for clients with a score lower than 25 on the WHOQOL. This decrease is of about 5 points on a scale of 66. For people with lower perceived quality of life at the second evaluation (score=35), there is a worsening of the score but limited to 2 points in 66. No effect was found for the informal caregiver's burden for non-cohabitants. For co-habitants, there was an increase of burden for people with burden at a low level (Zarit=9 – increase of 2 points in 48) and high level (Zarit=19 – increase of 5 points in 48).
- d) **The proportion of use of nursing care is lower in the intervention group.** This is a positive result since clients in this cluster have a very low level of impairment in ADL.
- e) **The proportion and the frequency of emergency visits decreases.**
- f) **The proportion and the frequency of visits to the GP out-of-hours increase.**
- g) **There is a slight decrease in the frequency of hospitalization.**
- h) **No difference was found for institutionalization or death.** This is expected since clients are not very frail in this group.
- q) **The cost for the NIHDI:**
- The intervention cost estimated was 213 euro per month per client.
 - The average cost of nursing care per month per client increased in the intervention group (from 42 euro to 79 euro). However, the average cost increased more in the control group after six months (from an average of 255 to 594 euro). This difference in the level of costs is significant for 25% of the intervention group.
 - The cost paid for GP and specialist consultations was lower in the intervention group than in the control group for 95% of the clients (after adjusting).
 - The cost of hospitalization is higher for 20% of the clients in the intervention group. These are the clients with the highest hospitalizations costs.
 - The total net cost at home is lower in the intervention group (average difference of 182 euro less per month). The average total cost (at home, intervention and hospitalizations) was not significantly different.
- r) **The cost for the region**
- Temporary stays in nursing home were not different between the two groups.
 - The difference in the cost of definitive institutionalizations was not significant. The average cost was 10 euros per month per client.

s) The cost for the clients and informal carers

- The cost of health care services and nursing home was higher for 20% of clients in the intervention group.
- The cost of temporary stays in nursing home was not different between the two groups.
- The difference in the cost of definitive institutionalizations was not significant.
- The cost of family care did not change before and after in the intervention group and was significantly higher than in the control group.
- The cost of household aid did not change before and after intervention but remained lower than in the control group.
- The cost of meals-on-wheels did not change and was significantly lower than in the control group.

l) For all stakeholders: the total net cost in the intervention group was not significantly different between the two groups. For about 25% of clients in the intervention group, the total net costs was lower.

m) There was no difference observed between the two groups for the number of days spent at home.

7.2.2. IADL impairment (with or without some cognitive problems)

- a) Improvement of the functional limitation.** A large improvement (for 50% of the clients) was found on the IADL functioning with a decrease in impairment up to 10 points on a scale of 48. This was observed for clients with IADL scores under 30 at the second evaluation. There is also a trend for ADL improvement but this trend is not significant. No difference was found on the risk of falls.
- b) Significant increase of the burden of the cohabitant informal caregiver.** Case management F1P111 is associated with a significant trend of increasing the burden of informal caregivers who live with the frail older person. This is the case for almost 60% of these informal caregivers. These results can be explained by the questionnaire of the Zarit. The burden of the non-cohabitants tends to decrease in the intervention group but this decrease was not significant and can be explained by the improvement in the IADL tasks.
- c) The quality of life is improved for 50% of the clients.** The intervention is associated with an improvement of the quality of life of clients with a score lower than 31 on the WHOQOL. This decrease is of about 5 points on a scale of 66.
- d) The positive result on the quality of life scores is associated with an improvement of the depression score.** The percentage of clients with a depression score above the cut-off decreases significantly in comparison with the control group.
- e) The proportion of use of nursing care is lower in the intervention group.** The unmet need of nursing care remained stable in the intervention group since 21% of this group had unmet needs before inclusion and 17% in the six months after inclusion. In the control group, these proportions decreased from 16% to 0.7%.
- f) The frequency of emergency visits is up to 2 times lower than in the control group.**
- g) No difference was found for hospitalization, GP out-of-hours visits or institutionalization.**

- h) The risk of death in the intervention group was lower than in the control group for this cluster.**
- i) The costs for the NIHDI**
- The estimated intervention cost was 202 euro per months per client.
 - The average cost of nursing care increased in the intervention group (from 96 to 184 euro). However, for 60% of the clients, the average cost per month was significantly higher in the control group after six months. The largest differences were for the 20% most costly clients.
 - The costs at home were lower in the intervention group (average of 323 euro less in the intervention compared to the control group per month). When including the costs of hospitalization and intervention, the costs for the NIHDI were in average 380 euro per month lower (for about 70% of the clients).
- j) The costs for the regions**
- Cost of temporary institutionalizations was not different between the two groups.
 - The cost of definitive institutionalizations was significantly lower in the intervention group (41 euro versus 82 euro).
- k) The costs for the clients and informal carers**
- For reimbursed health care services and nursing home, overall, there was no difference on the total cost between treated and controls
 - No difference was observed for the costs of temporary stay in nursing homes.
 - There was no difference on the cost of definitive institutionalizations.
 - No changes were observed for family care cost.
 - No differences for the household aid cost.
 - No differences were observed for the cost of meals-on wheels.
- t) For all stakeholders, the net cost difference between the intervention and the control group was on average -498 euro. These costs are lower for about 60% of the clients.**
- u) There was no difference in the total number of days spent at home between treated and control group.**

7.2.3. Functional (IADL & ADL impairment)

- a) Large improvement of the functional limitations.** We observe a large decrease in IADL impairment (up to 20 points in 48) for 30% of the clients mainly with IADL score lower than 33. An improvement is also seen for ADL impairment, with a decrease of about 2 points in 6 for about 50% of the clients (mainly clients with ADL scores under 3). A large improvement can also be observed on the proportion of falls.
- b) No difference on the informal caregiver's burden.**
- c) No difference on the perceived quality of life.**
- d) The intervention is associated with a significant improvement on the depression scores although no effect on the perceived quality of life was found.**

- e) The proportion of nursing care is significantly lower in the intervention group.** The proportion of unmet needs remained stable at 25% in the intervention group between the inclusion and the period of six months after. In the control group, in the period of six months after inclusion all needs were covered. However, there were no unjustified nursing care.
- f) The frequency of visits to the emergency department is lower in the intervention group.**
- g) The frequency of visits to the GP out-of-hours is lower in the intervention group.**
- h) The intervention is associated with a significantly higher proportion and frequency of hospitalizations in the intervention group.** This can be a good result because they are planned hospitalizations. As the emergency visits and GP out-of-hours visits are lower, the planned visits to the hospital are higher and this means that clients are more followed-up in their clinical conditions.
- i) The intervention is associated with higher institutionalization rates and higher death rates.** This can be an indication that clients in the intervention group are frailer than clients in the control group.
- j) The costs for the NIHDI**
- The estimated intervention cost was 141 euro per months per client.
 - The average cost of nursing care increased in the intervention group from 218 to 308 euro but these costs remained much higher in the control group for 100% of the clients. This difference varied from 100 euro less per month to almost 600 euro less per month.
 - The cost paid for GP and specialist consultations was not different in the intervention group compared to the control group.
 - The cost of hospitalization is higher in the intervention group for about 60% of the clients.
 - The costs incurred at home are lower in the intervention group (average 427 euro per client per month less than in the control group).
 - When we include the costs of hospitalizations and intervention, the costs in the intervention group are on average 444 euro lower than in the control group. This is the case for about 80% of the clients.
- k) The costs for the regions**
- The cost of daycare was not different between the two groups.
 - The cost of temporary stays in nursing home was higher in the intervention group (47 vs 7 Euro).
 - The cost of definitive institutionalizations was higher in the intervention group (105 Euro versus 23 Euro).
- l) For the clients and informal carers**
- For reimbursed health care services, the total net cost is higher in the intervention group for 20% of the clients with the highest costs.
 - The costs of temporary stay in nursing homes are higher in the intervention group (40 versus 10 in the control group).
 - The cost of definitive institutionalizations was higher in the intervention group (93 vs 20).
 - The informal care cost remained stable.
 - The household aid cost was not different between the two groups.
 - The cost of meals-on wheels increased significantly in the intervention group but remained lower than in the control group.

- m) **For all stakeholders**, the net cost was on average 313 euro lower in the intervention group. These costs were lower for almost 50% of the clients.
- n) There was a difference for almost 40% of the clients in the total days spent at home: less days at home for the clients in the intervention group.

7.2.4. Functional and cognitive problems (ADL, CPS)

- a) **Improvement of functional limitation.** We observe a decrease in IADL impairment (up to 5 points in 48) for 25% of the clients (with IADL score lower than 38). There is also an decrease of ADL impairment, with a decrease of 1 point in a scale of 6 for about 20% of the clients (clients with ADL scores under 3). In addition, a large improvement can be observed on the proportion of falls.
- b) **No significant difference for depression and on informal caregiver's burden.**
- c) **A limited improvement of quality of life.** Although no difference was found for depression, the intervention shows a limited effect on perceived quality of life for 20% of clients in this cluster (with WHOQOL score lower than 24).
- d) **The unmet need decreased from 27% of the intervention group before the inclusion to 17% after the inclusion and from 9% to 1% in the control group.**
- e) **There is a lower frequency of emergency visits in the intervention group.**
- f) **There is a higher proportion and frequency of hospitalizations in the intervention group.**
- g) **No significant difference was found for GP out-of-hours visits.** As in the cluster above, this can be a positive result as clients in the intervention group have less emergency department visits and the planned visits to the hospital increase.
- h) **The intervention is associated with higher institutionalization rates and higher death rates.** This can be an indication that clients in the intervention group are frailer than clients in the control group.
- i) **The costs for the NIHDI**
 - The estimated intervention cost was 165 euro per months per client.
 - The average cost of nursing care increased in the intervention group from 464 to 799 euro. Despite of this increase, the nursing costs were higher at baseline in the control group and also increased in the period of 6 months as well (from 929 euro to 1783 euro). The difference of costs after 6 months was significant for all clients.
 - The total medical cost paid for GP and specialist consultations was lower in the intervention group than in the control group for all clients.
 - The costs incurred at home were lower in the intervention group (average 544 euro per client per month less than in the control group, by including also the persons with behavioral problems).
 - When we include the costs of hospitalization and of the intervention, the costs were still lower in the intervention group (442 euro less, by including also the persons with behavioral problems). For about 70% of clients, the total net cost was significantly lower in the intervention group.

j) The costs for the regions:

- The cost of temporary stays in nursing home did not change between the two groups. The intervention group had already a higher cost before intervention.
- The cost of definitive institutionalizations was almost not different between the two groups (107 vs 57 Euro).

k) The costs for the clients and informal carers

- The reimbursed health care and nursing home costs were significantly higher in the intervention group for 20% of the clients. These were the clients with the highest costs.
- There was not difference of cost of daycare.
- The cost of temporary institutionalizations was higher in the intervention group compared to the control group before and after intervention. No difference between the two groups was observed since the difference existed before intervention.
- The cost of definitive institutionalizations was higher in the intervention group (102 Euro versus 47).
- The informal care cost remained stable before and after intervention. There is no difference between the intervention and the control groups.
- The household aid cost also remained stable.
- The cost of meals-on wheels increased did not change in the two groups. No difference are observed at baseline or after intervention.

l) For all stakeholders, the total net cost was no significantly different between the two groups.

m) The total number of days spent at home was not different between the two groups.

7.2.5. Functional and cognitive problems (ADL, CPS and also behavior group)

- a) No difference was observed on the functional outcomes in this cluster.** This could be expected since clients have a very high level of IADL and ADL impairment as well as cognitive problems.
- b) No difference was observed on the quality of life and on depression rates in this cluster.**
- c) A slight decrease was found in informal caregiver's burden for the co-habitants.** This decrease of max. 5 points in a scale of 48 happened for about 10% of the informal caregivers with a level of burden of 14 in the Zarit.
- d) Even after the intervention, some unmet needs of nursing care remain.** The proportion of nursing care is lower in the intervention group. The unmet needs stays at 25% of the intervention group. A decrease from 33% to 11.5% of unmet need was observed in the control group.
- e) A significant decrease of the frequency of emergency department visits.** The proportion of utilization was not significantly different but the frequency decreased up to 2 times for the users of this service in the intervention group.
- f) No significant differences were observed on the hospitalization and on the GP out-of-hours visits.**
- g) The intervention was associated with no changes on the risk of institutionalization or death compared with the control group.** We will expect that the CM with a psychological support component helps clients with high dependency to accept the institutionalization and prepare

their entrance in nursing homes. The rates of institutionalization were although not different than in the control group.

h) The costs for the NIHDI

- The estimated intervention cost was 164 euro per months per client.
- The average cost of nursing care increased in the intervention group from 263 to 556 euro. However, the nursing costs remained significantly higher in the control group in the period of 6 months for 50% of the clients (maximum of 500 Euro more in the control group).
- The total medical cost (GP and specialist consultations) was lower in the intervention group for 80% of the clients.
- The cost of hospitalization was higher in the intervention group only for 10% of the clients with the highest costs.
- The costs at home are lower in the intervention group (average 544 euro per client per month less than in the control group, by also including the group of functional limitations and cognitive impairment). When we include the costs of hospitalization and intervention, the costs are still lower in the intervention group (442 euro less).

i) The costs for the regions

- The daycare costs were significantly higher in the intervention group (80 versus 17 euro in the control group).
- There was no significant difference in the cost of temporary institutionalization.
- The difference of the cost of definitive institutionalizations was significant. The costs are higher in the intervention group (134 versus 29 euro).

j) The costs for the clients and informal carers

- The total cost of reimbursed health care and nursing home was not significantly different between the two groups.
- The cost of daycare was not different between the two groups.
- No difference for the cost of temporary institutionalization.
- The cost of definitive institutionalizations was higher in the intervention group (112 versus 26 in the control group).
- The informal care cost decreased in the intervention and control group.
- The household aid cost remained stable.
- The cost of meals-on wheels increased in the intervention group and control group but the difference did not significantly change.

k) For all stakeholders, the total net cost was on average not significantly different between the two groups (this analysis was made together with the previous group functional limitations and cognitive problems).

n) The total number of days spent at home was not different between the two groups.

8. Results of the effectiveness and the costs: Intervention with proper case management and a high intensity F111

8.1. Description of the target population

8.1.1. Historic health care profiles

Description of historic health care consumption profiles

The beneficiaries of interventions with proper case management and a high intensity were grouped in five historic health care consumption profiles:

- Clients without specific health care consumption before the inclusion in the intervention
- Clients with (hygiene) nursing care (for at least 3 months in the year before the inclusion, at least 2 times per week)
- Clients with recent hospitalization (hospitalization for more than one day in the two months before inclusion)
- Clients with short term institutionalization in the year before inclusion
- Clients with recent hospitalization and (hygiene) nursing care

Table 14 Socio-demographic characteristics per historic health care profiles for F111

	No event		Nursing		Hospi		STI		Nursing, hospi	
	T	C	T	C	T	C	T	C	T	C
Age										
Median[IQR]	81[74-85]	80[74-84]	82[76-86]	82[77-87]	81[76-85]	81[76-85]	83[78-88]	84[78-89]	83[78-87]	84[79-87]
Gender										
% Men	27.7	42.24	28.16	27.97	26.67	45.26	29.09	16.36	22.46	42.46
% Women	72.3	57.76	71.84	72.03	73.33	54.74	70.91	83.64	77.54	57.54
ICG										
% No ICG	13.04	-	7.62	-	11.58	-	18.18	-	2.81	-
% No cohabitant	64.1	-	61.06	-	71.58	-	58.18	-	77.19	-
% Cohabitant	22.86	-	31.32	-	16.84	-	23.64	-	20	-
Region										
Bruxelles	0.37	10.93	0	4.55	0	10.88	0	3.64	0.7	3.51
Flandre	72.55	54.91	77.97	65.43	87.37	53.68	70.91	49.09	89.12	69.12
Wallonie	27.08	34.16	22.03	30.02	12.63	35.44	29.09	47.27	10.18	27.37
Median income										
Low	14.29	26.71	11.25	23.14	5.61	32.28	23.64	29.09	7.02	32.98
Medium	63.48	49.19	55.3	55.39	81.75	47.72	38.18	50.91	77.89	46.67
High	22.24	24.1	33.46	21.47	12.63	20	38.18	20	15.09	20.35
N										
Unique value	805	716	1076	723	285	209	55	41	285	152

Description of the sociodemographic variables for each historic health care consumption profile

The figure hereafter presents the key previous disability profile of population grouped by historic health care consumption profiles. Following characteristics may be highlighted:

- A large proportion of unmet needs (clients with significant functional limitations who don't benefit of nursing care) in nursing care can be observed in the group "no event" and hospitalization.

Chapter 4 Results of case management interventions

8 Results of the effectiveness and the costs: Intervention with proper case management and a high intensity F111

- The nursing care was for the majority provided to clients with functional limitations or combining functional and cognitive impairments.
- The clients hospitalized had for the majority functional limitations
- The short term institutionalization was used mainly by clients with functional limitations or clients combining functional and cognitive impairments. The short term institutionalization was justified for these clients after a hospitalization or as a respite period for the informal caregivers.

Figure 23 Description of the disability profiles per historic health care consumption profile for F111



8.2. Results for the disability profiles

8.2.1. No event

- a) **The proportion of clients receiving nursing care is significantly higher in the intervention group** for the period of six and twelve months after the inclusion. The proportion of clients in the intervention group with unmet needs at the inclusion represented 27% of the total intervention group. This proportion decreased to 12.5% of the total intervention group during the period of six months after the inclusion. In addition, the higher proportion of nursing care in the intervention group cannot be explained by unjustified use of nursing care. This is a positive result of the intervention since clients who needed nursing care and did not receive it before the intervention are now receiving these services.
- b) **The proportion of short term institutionalization is significantly higher in the intervention group** on the period of six and twelve months after the inclusion. This service remains nevertheless marginal and concerns only 10% of the intervention group on the period of six months after the inclusion and 14% of the intervention group in the period of twelve months after the inclusion. Short-term institutionalization seems to be used to offer respite to informal caregivers in 35% of the case. In fact, 9.5% of the clients with IADL and initial cognitive problems for which 58% of the informal caregivers had a Zarit score above the cut-off have used these services. About 20% of the clients with functional and cognitive limitations for which 53% of the informal caregivers had a Zarit score above the cut-off were also identified as users of short-term institutionalization as well as 19% of the clients with functional and cognitive impairment and additional behavioral problems. For this last group all informal caregivers had a Zarit score above the cut-off. A total of 48% of the short term institutionalization was used by clients with functional limitation probably in the follow-up of a hospitalization. It is, nevertheless, difficult to justify the 17% of the short-term institutionalization which were used by clients with low limitations.
- c) **The proportion of use of day care center was significantly higher in the intervention group.** This significant difference was in terms of proportions very low due to the fact that the proportions were almost negligible. However, the users in the intervention group spent more days in day care centers. This interpretation can be done on the period of six and twelve months after the inclusion.
- d) **The proportion of emergency visits is significantly lower in the intervention group for the period of one year before the inclusion.** The opposite was observed for the period of six months after the inclusion: the intervention group used significantly more often the emergency service. As it was shown for the F110 interventions, the effect of CM on the emergency visits seems to be more of a long-term effect.
- e) **The risk of death was higher in the intervention group** on the period of six and twelve months. It is more difficult to identify a control group with similar frailty when no specific event was observed before the inclusion. The control group was probably frailer than the intervention group.
- f) **The proportion of hospitalization was significantly higher in the intervention group.** This result was not a negative impact of the intervention. In fact, the proportion of planned hospitalization was higher in the intervention group but at the same time the proportion of emergency visits was lower in the intervention group. The intervention appears to be capable of responding to unplanned hospitalizations or social/crisis problems. In addition, the higher

proportion of hospitalization can be explained by the higher level of frailty of the intervention group.

g) **The proportion of institutionalization is higher in the intervention group** during the period of six and twelve months after inclusion. However, the risk of institutionalization was low with only 8.5% of the total intervention group institutionalized. The proportions of institutionalization were also lower depending on the dependency groups: 4.7% of clients with low limitation, 9.2% of the clients with IADL and initial cognitive problems, 8.4% of clients with mainly functional limitations, 16% of clients with functional and cognitive problems and 15% of clients with additional behavioral problems.

h) **The cost for the NIHDI**

- The estimated intervention cost was 176 euro in average per month per client.
- The average cost of nursing care per month per client increased more in the intervention group than in the control group (from 3 to 122 euro). At baseline, they started at the same level in the two groups. An increase was expected since these clients had no nursing before the start in the project. The level of nursing costs for 6 months after intervention was higher in the intervention group than in the control group (for 45% of the clients). At 12 months, these costs kept increasing significantly (until average was 149 Euro at 12 months) but the proportion of clients with higher costs than the control group was lower than at 6 months (20%). The costs were lower than the control group for 30% of the clients at 12 months.
- The cost of GP and specialist consultations was higher in the intervention group than in the control group. This was observed for 50% of the clients. At 12 months the costs in the intervention group, about 20% of clients with high medical cost in the intervention group had a higher cost than in the control group.
- The cost of hospitalizations was higher in the intervention group, for about 50% of the clients at 6 months and for about 20% at 12 months.
- Concerning the costs at home, the total cost was higher in the intervention group. They were on average 220 euro more per month for 6 months and 200 euro more in 12 months).
- When including the costs of home care, hospitalization and intervention costs, the costs were in average 1637 euro per month higher in than in the control group. On the period of 12 months, these costs remained higher and were 1143 euro per month more than in the control group.

i) **The cost for the regions**

- The cost of day care did not significantly change.
- The cost of temporary stays in nursing home was higher in the intervention group for 6 months (23 vs 4 euro) and 12 months. The cost did not differ significantly between 6 and 12 months.
- The cost of definitive institutionalizations was not different between intervention and control groups for 6 months but was significantly higher for 12 months in the intervention group (71 versus 44 euro).

j) **The cost for the clients**

- For reimbursed health care services and nursing home, the costs are higher in the intervention group for 6 months and 12 months for almost 50% of clients.
- The cost of day care was significantly higher in the intervention group for 6 months and 12 months.

- The cost of temporary institutionalizations was significantly higher in the intervention group for 6 (average cost of 29 Euro versus 4 Euro in the control group) and 12 months but it remained stable between the 6 and 12 months.
 - The cost of definitive institutionalizations was not significantly different between treated and control for 6 and 12 months.
- k) **For all stakeholders**, the net cost was significantly higher in the intervention group: + 1736 Euro at 6 months and + 1329 at 12 months compared to the control group. These costs were higher for all clients in both periods.
- l) For the periods of 6 and 12 months, the average days at home was lower before and after intervention in the intervention group: no change was observed after implementing the intervention.

8.2.2. Nursing

- a) **The proportion of nursing care tends to decrease more in the intervention group.** The proportion of unjustified use of nursing care (nursing care offered to clients without hygiene task and incontinence problem) is low (5.3% of the total intervention group). During the period of six months after inclusion, only 14.1% of the clients with hygiene tasks difficulties and 10.7% of the clients with hygiene tasks and incontinence problems stopped the use of nursing care.
- b) **The proportion of short term institutionalization was significantly higher in the intervention group** during the period of six and twelve months after inclusion. This service was used by 25% of the intervention group in the year after inclusion. Half of the short term institutionalizations were used by clients with mainly functional limitations which may be explained in the follow-up of a hospitalization. Only 5% of short-term institutionalizations seem unjustified because they were provided to clients with low limitation. The remaining were respite stays.
- c) **The proportion of use of day care center was significantly higher in the intervention group.** That concerns a slight number of clients (6% of the intervention group and 4% of the control group during the period of twelve months).
- d) **The proportion of emergency visits was significantly lower in the intervention group during the period of one year after inclusion.** 45% of the control group had emergency visits during the year after inclusion for only 25% of the intervention group. In addition, in the year after inclusion, the users of emergency services from the intervention group returned less frequently to the emergency department.
- e) **The risk of death is significantly higher in the control group.** The control group may be frailer than the intervention group.
- f) **The proportion of hospitalization is higher in the intervention group.** That cannot be explained by the level of frailty due to a higher risk of death in the control group. However, the odds ratio was significant but the proportions between intervention and control group stay close (respectively 29% and 32% during the year after inclusion).
- g) **The risk of institutionalization was higher in the intervention group.** That cannot be explained by the difference of frailty. In addition, 60% of the institutionalization were for less frail clients: people with low limitation (6%), clients with mainly functional limitations (37%) or clients with IADL and initial cognitive problems (17%). Maybe there was an influence from the umbrella organization of the interventions.

h) The costs for the NIHDI

- The estimated intervention cost was 174 euro per months per client.
- The average cost of nursing care was not significantly different after six months between treated and control. The average cost per month was 474 euro in the intervention group and 484 in the control group in the period of 6 months.
- The cost paid for GP and specialist consultations was significantly lower in the intervention group than in the control group for about 50% of the clients for 6 months and for all clients for 12 months after intervention.
- The cost of hospitalizations was higher in the intervention group. This was observed for about 35% of clients for 6 months and 12 months.
- The costs incurred at home were higher in the intervention group (in average + 97 euro per client per month more than in the control group). At 12 months the costs at home in the intervention group was not different from the cost in the control group.
- When we include the costs of hospitalization and intervention, the costs were significantly higher in the intervention group (the average cost difference of 586 euro more for 6 months and 495 higher for 12 months) The cost difference was observed for all clients in both periods.

i) The costs for the regions

- Daycare cost was not different between the two group before and after intervention.
- The cost of temporary institutionalizations was significantly higher in the intervention group for the periods of 6 and 12 months after intervention. The average cost was 39 Euro per month per client for six months after intervention (12 in the control group). However, these costs were also significantly higher before the intervention. The difference observed before intervention between the two groups remained the same after intervention.
- The cost of definitive institutionalizations was significantly higher in the intervention group at 6 and 12 months. The average cost was 68 Euro for six months after intervention (versus 44 in the control group).

j) The costs for the clients

- For reimbursed health care services, the costs are higher in the intervention group at 6 months and 12 months for about 25% of all clients in both periods.
- The cost of temporary institutionalizations was significantly higher in the intervention group at 6 and 12 months. The average cost was 41 euro per month per client for six months after intervention (versus 12 Euro).
- The cost of definitive institutionalizations was significantly higher in the intervention group at 6 and 12 months. The average cost was 60 euro per month per client for six months after intervention (versus 42 Euro).

k) For all stakeholders, the net cost is significantly higher in the intervention group: + 774 Euro at 6 months compared to the control group and +776 for 12 months. These costs are significantly higher for all clients for 6 and 12 months.

l) For the periods of 6 and 12 months, the average days at home was lower for the intervention group. When adjusting for the socio-economic status and the number of days alive, the average days at home was lower in the intervention group than in the control group for 12 months for 50% of clients.

8.2.3. Hospitalization

- a) **The proportion of use of nursing care was higher in the intervention group during the six months after inclusion.** This difference was not observed during the period of one year after inclusion. The comparison of the baseline and the second evaluation of the BelRAI scales shows an important potential of recovery. This recovery can be explained by the profile of the clients. All clients were hospitalized in the two months before inclusion, they were in an acute situation. In addition, the needs of nursing care seem to be covered in the period of six months after inclusion, with only 8% of unmet needs remaining and 3% of unjustified nursing care in the period of six months.
- b) **The proportion of short term institutionalization was significantly higher in the intervention group during the six months and the year after inclusion.** The short term institutionalization was used in 90% of the cases for clients having possible need of informal caregiver's respite or in the follow-up of a hospitalization.
- c) **No significant difference was shown for the day care center.**
- d) **The proportion of emergency visits was lower in the intervention group.** The proportion of clients in the intervention group who visited the emergency department was 1.8 times lower in the six months after inclusion and 2.8 times lower in the year after inclusion than in the control group. In addition, the users of emergency returned less frequently in the intervention group.
- e) **No difference was observed on the risk of death.** The level of frailty seem to be similar between intervention and control group.
- f) **No significant difference was shown for the hospitalization.**
- g) **The risk of institutionalization was lower in the intervention group.** It is an interesting result because the level of frailty was similar between the intervention and control groups. The proportion of institutionalization was low. However, the proportion of institutionalization could have been even lower. In fact, 87% of the institutionalizations were for clients with low limitation or functional limitation. In the other hand, 100% of the clients with functional, cognitive and behavioral problems were institutionalized.

The discharge from the hospital seem to be a good moment to initiate case management. However, it must be borne in mind that the group includes clients with recent hospitalization before inclusion but with also a certain level of frailty.

h) The costs for the NIHDI

- The estimated intervention cost was 149 euro per months per client.
- The average cost of nursing care significantly increased in the intervention group for six months control group (139 euro in the intervention group versus 63 Euro per client per month in the control group). The difference observed for 6 months remained the same for 12 months.
- The cost of hospitalizations was significantly higher in the intervention group for six months after intervention for about 40% of clients.
- The costs incurred at home was higher in the intervention group (217 euro more costly in the intervention group in average) for six months after intervention.
- When we include the costs of hospitalization and intervention, the costs were still higher in the intervention group (average difference of cost of +832 euro more at 6 months).

i) The costs for the regions

- No cost differences were observed between the two groups for daycare.
- The difference of costs between treated and control for temporary institutionalizations was not significant for the period of 6 months and 12 months.
- The cost of definitive institutionalizations was significantly lower in the intervention group at 6 and 12 months (60 euro in the intervention group versus 114 Euro in the control group for six month per client).

n) For the clients

- The total cost of health care services and nursing home was not different between the two groups.
- There was not difference of cost for daycare.
- The cost of temporary stays in nursing home was significantly higher in the intervention group for twelve months (average cost of 48 Euro versus 29 Euro in the control group).
- The cost of definitive institutionalizations was significantly lower in the intervention group for 6 and 12 months (55 Euro in the intervention group versus 116 euro per client per month in the control group for 6 months). There was no difference observed between 6 and 12 months.

j) For all stakeholders, the net cost was higher in the intervention group: +864 Euro at 6 months and +630 at 12 months (by also including STI and Nursing, Hospi) compared to the control group. These costs were higher for 80% at 6 months and almost all clients for 12 months in the group Hospi only.

k) For the periods of 6 months, the number of days at home was slightly lower in the intervention group (35% of clients).

8.2.4. Short term institutionalization

a) The proportion of use of nursing care was higher in the intervention group. The use of nursing care was justified in the intervention group by difficulties in performing hygiene tasks and/or incontinence problems. At inclusion 28% of the clients had unmet needs. Six months after inclusion this proportion was reduced to 13.7%.

b) The proportion of short term institutionalization is lower in the intervention group during the period of six months and twelve months after inclusion. All clients have already used short term institutionalization before inclusion but only 27% of the intervention group returned in the year after inclusion for 58% of the control group. The majority of the short-term institutionalization seems to be used as a respite for the informal caregivers. In fact, 55% of clients with short-term institutionalization had significant functional and cognitive problems and 11% of clients had IADL and initial cognitive problems. The burden of their informal caregivers was significant (Zarit score above the cut-off) for all informal caregivers of the clients with short-term institutionalization and with functional and cognitive problems. The remaining 33% of the clients with short-term institutionalization had mainly functional limitations, probably in the follow-up of a hospitalization. These short term institutionalizations appear to be justifiable. They cover an important proportion of the clients

with a high level of dependency (20% of clients with IADL and initial cognitive problems, 25% of clients with mainly functional limitations, 50% of clients with functional and cognitive limitations and 33% of clients with also behavioral problems).

- c) **No difference was observed for day care center.**
- d) **No difference was found for the proportion and the frequency of emergency visits and GP out-of-hours.**
- e) **No difference for the risk of death.** The level of frailty was similar between intervention and control group.
- f) **No difference on the proportion and the frequency of hospitalization.**
- g) **The risk of institutionalization is lower in the intervention group.** The proportion of institutionalization (30% of this group) was, nevertheless, substantially higher when the clients had short term institutionalization before the inclusion. The short term institutionalizations may be a good preparation for the definitive institutionalization. It seems to be very essential to target effectively the population going into short term institutionalization in order to admit the right people. In this example, half of the definitive institutionalizations may be justified by the level of dependency of the clients. In fact, these clients combine functional, cognitive limitations and significant burden of the informal caregivers.

- h) **The costs for the NIHDI:**
 - The estimated intervention cost was 178 euro per months per client.
 - The average cost of nursing care increased significantly for 6 and 12 months and remained higher than in the intervention group (691 versus 186 Euro in average per month). For twelve months, the difference between the two groups increased (802 euro versus 196 Euro. The level of nursing costs in the intervention group was higher for 6 months for 60% of clients and for 12 months, for 50% of clients.
 - The cost paid for GP and specialist consultations was higher in the intervention group than in the control group for 80% of the clients at 6 months and for 90% of the clients at 12 months.
 - The cost of hospitalizations was not different between the two groups in both periods.
 - The costs incurred at home was not significantly different between the two groups (by also including the group of Hospi Nursing).
 - When we include the costs of hospitalization and intervention, the total cost was higher in the intervention group (average difference of cost of +730 euro more at 6 months and + 589 higher for 12 months).

- i) **The costs for regions**
 - No cost differences were observed between the two groups for daycare.
 - The costs of temporary institutionalizations were significantly lower in the intervention group in both periods (33 euro versus 258 in the period of 6 months and 35 versus 230 euro in the period of 12 months).
 - The cost of definitive institutionalizations was significantly lower in the intervention group for 6 months (255 Euro in the intervention group versus 592 Euro per month per client) and for 12 months (341 Euro in the intervention group versus 656 Euro per month per client)

- j) **The costs for clients**
 - For reimbursed health care services, the costs are lower in the intervention group for six and twelve months for 50% of clients.

- The costs of temporary institutionalizations were significantly lower in the intervention group for the period of 6 months (32 euro in the intervention group versus 256 Euro in the intervention group for six months) and 12 months.
 - The costs of definitive institutionalizations were significantly lower at 6 and 12 months (201 Euro per month in the intervention group, versus 597 Euro in the control group for six months).
- k) **For all stakeholders**, the total net was significantly higher in the intervention group (690 euro more in the 6 months and 630 euro more in the 12 months, by also including Nursing Hospitalisation).
- l) For the periods of 6 and 12 months, the average days at home did not differ between the two groups

8.2.5. Nursing & Hospitalization

- a) **The proportion of nursing care decreases significantly in the intervention group.** However, 95% of the clients with significant hygiene tasks difficulties or combining these difficulties with incontinence problems continue to receive nursing care. The case management F111 seems to respond correctly to the need of the clients.
- b) **The proportion of short term institutionalization is higher in the intervention group during the period of six and twelve months after the inclusion.** This proportion is approximatively 2 times higher in the intervention group. The informal caregivers of clients with short term institutionalization appear to have a significant burden. Even for clients with mainly functional limitation and for clients with IADL and initial cognitive problems who used this service, respectively 61% and 70% of the informal caregivers had Zarit score above the cut-off). So, these short term institutionalizations can be justified by a combination of the level of dependency of the clients and the burden of their informal caregivers.
- c) **No difference was shown for the use of day care centers.**
- d) **The proportion of emergency visits was lower in the intervention group during the year after inclusion.** Despite a greater proportion of nursing care in the control group, one client in two used emergency services in the control group for only one client in four in the intervention group.
- e) **The risk of death was higher in the control group.** These clients were maybe frailer than intervention group.
- f) **No significant difference was observed on the hospitalization.**
- g) **No difference was observed on the institutionalization.**
- b) The costs for the NIHDI:**
- The estimated intervention cost was 138 euro per months per client.
 - The average cost of nursing care increased in the two groups, but the level of nursing costs in the intervention group was slightly lower for 6 months for about 40% of clients and at 12 months for 80% of the clients. The costs were on average 360 euros per month per client for the intervention group and 432 In the control group in the period of 6 months.
 - The cost paid for GP and specialist consultations was significantly lower in the intervention group than in the control group for about 20% of the clients for 6 months and for 90% of the clients at 12 months.

- The cost of hospitalizations was significantly higher in the intervention group (after adjusting) for 25% of clients for 6 months.
 - The net cost (at home, intervention and hospitalizations) was higher in the intervention group for about 25% of clients for 6 and 12 months. When we include the costs of hospitalization and intervention, the total cost was on average 730 euro more at 6 months and + 589 more for 12 months (together with group STI, Hospi).
- c) The costs for regions:**
- No cost differences were observed between the two groups for daycare.
 - The costs of temporary institutionalizations was not different between the two groups.
 - The cost of definitive institutionalizations was not different between the intervention and control groups for 6 months and 12 months. The average costs are 103 euro in the intervention group and 87 euro in the control group per month per client (in the 6 months).
- d) The costs for clients**
- Concerning the reimbursed health care services and nursing home, the costs were not different between the two groups.
 - No cost differences were observed between the two groups for daycare.
 - The cost of temporary stays in nursing home was higher in the intervention group for 6 months (82 Euro versus 43) significantly and for 12 months.
 - The difference of costs of definitive institutionalizations was not significant for the period of 6 or 12 months.
- o) For all stakeholders, the net cost was higher in the intervention group: +690 Euro at 6 months and +630 at 12 months (by also including STI, Hospi) compared to the control group. These costs were higher for 40% at 6 months and 30% at 12 months (in this group only).**
- p) There was a small difference for 6 months (less days at home for 20% of the clients in the intervention group). No difference was observed for 12 months.**

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Chapter 4 Results of case management interventions

8 Results of the effectiveness and the costs: Intervention with proper case management and a high intensity F111

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