DEVELOPMENT OF A CLASSIFICATION SYSTEM FOR PATIENTS REFERRED TO A REHABILITATION PROGRAM FOR VISUAL IMPAIRMENT: A METHOD FOR ANALYSIS AND BUDGETARY CONTROL.\(^1\)

The objective of the present study is to propose a classification model for elderly persons aged 65 years and over admitted to a rehabilitation program for visual impairment based on the full operating costs. Starting from the functional profile of each patient at admission in the clinical program, an experimental approach made it possible to divide the patients into 5 (five) homogeneous groups regarding the total incurred financial resources.

Introduction

Establishments in which health care services are offered are continually evolving their measurement of the performance and accuracy reliability of results. The report of the Bédard committee (2002) on the reevaluation of the budgeting method, used by hospitals for both general and specialized care in Québec, mentions that the Ministry of Health and Social Services should take into consideration the financial performance of hospitals in budgetary appropriations for future developments in order to invest in hospitals that are more susceptible in providing the best care and return on investment. In France, the Secretary of Health, Dominique Gillot, affirmed, "We are not in a budgetary recessionary period, but the funds must be used in the most rational possible way (Garcia and Mandraud, 1999).

Most of the countries in the Western world have equipped themselves with tools such as Diagnostic related groups (DRG) for patients in order to better control the costs of their health care establishments. However, if this cost control tool seems sufficiently spread throughout the medical field, it is much less so in the field of rehabilitation. The establishments for rehabilitation of the physically impaired generally do not possess the key data on the use of care and services per hospitalized patient or external clinic. In Québec, for example, establishments possess key data but only on activity areas for the entire patient base that use their services. Very little precise data on the costs of the resources used for each patient is available thus included in the reports sent by the establishments to the Ministry of Health and Social Services and in the databases (Durand and al., 2001). Moreover, the Ministry of Health and Social Services calculates the amount on a per diem basis that represents a measurement of little precision relative to the costs of the resources actually used. Consequently, at present, it seems that it is difficult for the public service to make enlightened decisions regarding budgetary allocations because of a lack of proper tools or pertinent data to evaluate clinical results and the inherent costs of programs in

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\(^1\) The authors wish to thank all the people involved in this project as part of the rehabilitation program for the visually impaired aged 65 years and over from the Quebec Institute of rehabilitation of the physically impaired.
establishments (Nicklin and Zitner, 2002). For the most part, the ministries rely on historical data to allocate the operating costs of their establishments, which do not consider, at all, the needs of the population at large.

From a perspective of cost management for rehabilitation establishments, the development of a classification system based on the Functional related group can contribute to improving the budgetary control for health care programs for physical impairment. The proposed model is based on an experimentation program with visually impaired persons 65 years and over. The following text of this document is divided into four sections. The existing relevant research is first presented, then the research design, followed by the principal results of the study and finally the conclusion discussing the recommendations of the research.

**Literature Review**

**Present State of Conditions Relative to Classification Systems**

The evaluation of resource allocation has constituted for a long time the cornerstone for hospital control systems (Halgand, 2000). A major advance in this domain has resulted from the utilization of Diagnostic related groups as a conceptual design tool.

It was a group of American researchers, led by professor Fetter of Yale University, that first designed the Diagnostic related groups during the nineteen seventies. The Diagnostic related groups is designed to group together the patients and the costs that result from their treatment into a number of diagnostic categories (initially, 492) according to the severity and the nature of the illnesses. The principal goal initiated by Fetter (1991) when he designed this grouping system was to identify the complete costs of compensation benefits on behalf of private insurers for tariff or costing purposes. However, the system also provides assistance for managers to administer more efficiently their health care establishments by defining a "product" as a base for measuring and evaluation. By grouping together the treatments of patients and the resulting costs into different diagnostic categories, this management tool aims to establish a link between resource utilization and the various particular treatments of patients thus permitting managers of health care centers to apply some of the techniques used by commercial or industrial managers such as flexible budgets, margin analysis, and the control of costs and quality etc. (Fetter, 1991).

In France, this concept, known under the name of "Groupe homogène de maladies" (GHM), was introduced in 1984-85 as part of a project that eventually led to the Medical program for information systems (Dubois, 1999). The Medical program for information system is a measurement and descriptive tool of hospital medical activity (Coca, 1998, Engel and al., 2000) that aims to provide pertinent data information per illness and/or patient, that is, the GHM (Nobre, 2000). Approximately 600 GHM are now listed for hospital admissions in medicine, surgery, and obstetrics (Nobre and Biron, 2001). No matter where it is used, the implemented systems are ultimately linked to determine standard costs by GHM or DRG groups that serve as references for hospital establishments.

With the same objectives, certain researchers are attempting to reproduce this type of grouping for rehabilitation cases. However, contrary to the medical field where the Diagnostic related groups seem to be increasingly used and were elaborated on a group logarithm based on principal and secondary diagnostic variables along with treatment, age of the patient, type of exit upon release, and gender, groupings based on these variables in the rehabilitation field do not provide convincing results (Harada and al., 1993; Paolucci and al., 1998). In effect, in the rehabilitation domain, it is necessary to examine a classification system that takes into account the Functional state of the person.
It was in 1993 that Harada and al. (1993) formulated a uniform data classification system based on Functional related groups (FRG). Then, in 1994, a group of researchers at the University of New York in Buffalo refined the model to develop the first version of the “Functional Independence Measure - Functional Related Group” FIM-FRG. The FIM-FRG system aims to group patients and resulting treatment costs into a number of categories of functional independence. In the first version, there were 18 diagnostic categories forming 53 groups based on the primary diagnostic or type of incapacity, the FIM motor and cognitive score at admission as well as age. The second version, named FIM-FRG2, included three new categories: two related to the type of incapacity and one related to ambulatory patients. In total, the FIM-FRG2 comprises 67 groups. This classification identifies, for example, patients who experienced a stroke into nine groups based on the motor and cognitive Functional level score at admission as rated by the Functional independence measure (Keith and al., 1987), as well as age (Stineman and al., 1998).

As a rule, most of the classification models such as the FIM-FRG and AN-SNAP were developed, principally, to categorize groups of hospitalized patients. A few models such as the “Ambulatory Visit Groups”, the “Ambulatory Patient Groups” and the “Ambulatory Care Groups” are designed more particularly to evaluate patients in external consultation and have, for the most part, opted to classify patients per action rather than the complete treatment (Eager and al., 1999). However, the AN-SNAP also has specific categories for external consultation based on the type of incapacity, functional independence, and recourse towards a simple or multidisciplinary therapy. There are fifteen categories for rehabilitation, with two for evaluation and thirteen for treatment. It is the only ambulatory classification identified to date that was developed specifically for rehabilitation (Eager and al., 1999).

The ensemble of work done on Functional related groups does not cover all types of rehabilitation of physical impairment (auditory, language and speech, motor and visual). The classification systems previously presented are focused on the rehabilitation of physical motor impairment. In addition, these classifications are foremost related to rehabilitation in functional intensive care units. At present, no classification system seems to cover the rehabilitation of visual impairment.

Finally, although not specifically adapted for the field of physically impaired rehabilitation but instead orientated for residential patients and support for the elderly who have a loss of autonomy, two classification systems, one from Quebec, and one from France, deserve discussion. The researchers in Quebec are particularly interested on a management system based on the classification of the needs of the patients with a Functional autonomy profile named ISO-SMAF (Dubuc and al., 1999). Developed from the Functional autonomy measurement system (Hébert and al., 1988), the 14 ISO-SMAF profiles group together persons having a similar incapacity profile that require, overall, similar services (ISO-Resource groups, described below) and that generate equivalent costs ($ISO-SMAF). The ISO-SMAF profiles may also be used in all health care facilities, from home-care to long term care establishments. This particularity meets the preoccupation of the Quebec Health and Social Services system in terms of efficiency, quality, and continuity towards fulfilling the needs of elderly persons suffering a loss of autonomy. The ISO-SMAF profiles permit the fast identification of the needs of persons with a loss of autonomy as well as the services required for each condition. With the same fundamental objectives, the French researchers have developed the ISO-RESSOURCES (National Association of Gerontology Clinics, 1994). Each group represents a sub-group of persons that require the same mobilization of resources to meet the challenge or dependence. The parameters of the ISO-RESSOURCES groups are based on the principals of the AGGIR (ISO-Resources gerontology autonomy groups) table. Only ten of the seventeen variables that comprise the AGGIR table are used for the calculations of the ISO-RESSOURCES groups. These discerning factors are coherence, orientation, toilet use, dressing, ability to feed oneself, waste elimination, self-transfers or displacements, internal mobility at home or at a facility, outdoor mobility, and communication at a distance. The model classifies patients into six ISO-RESSOURCES groups.
Critical Assessment of Existing Classification Models

One of the essential criteria in developing a classification system is measuring the clinical results. It is particularly on this point that rests the critiques of the existing classification system. In effect, in the majority of previous studies on the evaluation of rehabilitation services, Functional independence as measured with tools such as the Functional independence measure (FIM), the Functional autonomy measurement system (SMAF), the Bartel index as well as others have often been used as a measurement of clinical results (Desrosiers and al., 2001). The independence of patients for basic activities such as personal care and walking are often the desired results of rehabilitation programs (Radomski, 1995; Tyson, 1995). Therefore, if this method of measuring results of the state of intensive rehabilitation is the norm (step 2 of the general process in rehabilitation of physical impairment presented in Appendix 1), it does not reflect the opinion of professionals insofar as evaluating the results of the adaptability and rehabilitation that covers notably Functional rehabilitation, development of psychosocial autonomy, school or professional learning and integration, and maintaining autonomy in various settings (steps 3 and 4 of the general process in rehabilitation of physical impairment). The ability to walk, wash, and to dress oneself are not the only indispensable elements in returning to a normal lifestyle (Desrosiers and al., 2001). In addition to recovering certain key lifestyle essentials, the results should also include other important activities and roles normally associated with an optimal quality of life (Desrosiers and al., 2001).

The majority of these clinical evaluation tools for rehabilitation is based on conceptual models from the International Classification of Impairments, Disabilities, and Handicaps (ICIDH) and the International Classification of Functioning Disability and Health (ICF) and result from a perspective of biomedical handicap reconstruction. This practice tends to demonstrate that they are not well adapted to clinical intervention methods desired by the Association of health care establishments for physical impairment in Quebec and the Quebec Ministry of Health and Social Services. In effect, a more social perspective on developing such skills for handicapped persons, in accordance with the Disability creation process (Fougeyrollas and al., 1999), contributes to radical modifications to the definition of the clinical intervention mode as well as the evaluation tools for evaluating clinical results (Coulmont, 2008).

The ultimate objective of rehabilitation establishments for physical impairment of its patient base is to favor the social participation of its members having significant and persistent incapacities resulting from physical impairment (Association of Quebec rehabilitation establishments for physical impairment, 2000). To this end, the specialized rehabilitation services aim more particularly in reducing the obstacles for handicapped persons by achieving the following objectives: developing essential aptitudes of persons to attain their lifestyles, compensating for residual incapacities, and reducing physical and social obstacles susceptible to limiting such persons from realizing their lifestyles. Hence, the Functional independence measure is completely incapable of achieving these clinical results insofar as the services offered by rehabilitation establishments for the physically impaired. Based on the conceptual plan of the Disability creation process (Appendix 2), the recent works of Fougeyrollas and al. (2002) have permitted the development of a tool to measure the progression of rehabilitation that seems capable of supporting the evaluation of clinical results for adaptability-rehabilitation. Considering the planning and organization of rehabilitation services in Quebec, developing a classification system based on this method of measurement seems more justifiable.
Research Design and Sample

Research Design

This study aims to establish a classification system for persons with visual impairment in rehabilitation centers for physical impairment based on full operating costs. To accomplish this goal, the study is, in part, transversal (clinical data obtained for a particular moment such as entering the clinical program) and also, in part, longitudinal (total costs reflecting the resource utilization per patient during the entire elapsed time of treatment). Consequently, the research strategy adopted is a study of prospective patients of the population at large. The study is based on a sample population of 100 persons aged 65 years and older enrolled in adaptability-rehabilitation for the visually impaired where the rehabilitation was conducted at the Quebec Rehabilitation Institute for the Physically Impaired.

Classification Variables

Note the importance for a classification system to be anchored, upon its development, on a conceptual design to accurately reflect the reality of health conditions of the community being studied. Consequently, in the case of elderly persons with visual impairment, this design must incorporate the situations that handicapped persons endure. Thus, the Functional global profile measurement, calculated from the Measure of progression in rehabilitation (MPR), permits the determination of the effects of impairment on the lifestyle constraints of the handicapped. The measure of the Functional global profile is determined based on 24 lifestyle habits that comprise the tool of the Measure of progression in rehabilitation. Each functional profile receives a lifestyle habit of 0 to 25, based on precise criteria, from information obtained by questioning and observing the patient. A theoretical score of 600 relative to the Functional global profile corresponds to a patient who represents no handicap whatsoever. The lower the score, the more the patient is handicapped. Three other variables must be considered for classification in accordance with existing models: the age of the patient, total time of the services offered (elapsed time), and the gender, whether male or female.

The full operating costs have been obtained from the method of calculations based on activity-based costing. The accounting system, based on the manual for financial management by the Ministry of Health and Social Services, is designed for a management style approach of activity groups. This method incorporates the financial charges per activity group (number of patients, number of beds, etc.) that serves as a base for allocating financial budgetary resources by the Ministry of Health and Social Services. Among these charges, we generally distinguish three categories (Hébert and al., 1997): treatment services (direct intervention to the patients such as professional services from educators, occupational therapists, physiotherapists, speech therapists, etc.), support services (ancillary help for treatment activities such as cleaning staff, laundry, food services, etc.), and general and administrative services (all other services that support the organization). The total operating cost has been established by also considering the relative charges of these three types of categories of activity centers.

Other Variables

Other typical variables such as the secondary diagnostic (macular degeneration, glaucoma, etc.), and the level of impairment severity were obtained from the classification by the World Health Organization (1996). They underwent verification as to their possible influence on the utilization of resources and were excluded from the model analysis. In effect, the statistical analysis on these other variables demonstrated that they had no influence on the use of financial resources (full operating costs on services incurred by patients).
The Method of Analysis

The definition of groups was done in two stages. The first step was to identify the factors influencing the utilization of services by using a multivariate regression. This had, as an objective, to define the relations between a dependent variable, the full operating costs of a patient and multiple independent variables, the Functional global profile at admission, the age and gender, and the total elapsed time for services offered. A step-by-step regression technique was used to identify the variables having the greatest explanation for the variance of the dependent variable.

\[
\text{FOC}_j = \alpha_0 + \alpha_1 \text{FGP}_{T1j} + \alpha_2 \text{AGE}_j + \alpha_3 \text{GENDER}_j + \alpha_4 \text{TIME}_j + \epsilon_j
\]  

In which:

- \(\text{FOC}_j\) = full operating cost of a patient \(j\) expressed in dollars;
- \(\text{FGP}_{T1j}\) = Functional global profile at admission of the patient \(j\);
- \(\text{AGE}_j\) = age of the patient \(j\) at admission for rehabilitation;
- \(\text{GENDER}_j = \) Gender of the patient \(j\) (0 = female & 1 = male);
- \(\text{TIME}_j\) = total elapsed time in which services are offered to the patient \(j\) in number of days;
- \(\epsilon_j\) = error term.

The second step was to define the groups or a classification system from the variables that seemed to have the most influence on the utilization of services. In order to realize this classification, the decision trees were used because they are well adapted to the context of this study. They build the partitions or steps in descending order. Starting with the initial crux or node that represents all the profiles, they proceed in successive junctures until a critical stop is reached. The successive junctures in accordance with each node, choice indicator, and the partitioning of the node depending on the modalities of such a node, are done by optimizing a local criteria; for example, the significance of a Chi-2 in the "Chi-square Automatic Interaction Detection" (Kass, 1980).

Results

Descriptive Analysis of Sample Population

The average age at the inception / admission of the program was 81.76 years (SD = 7.18 years; range between 67 and 98 years). Regarding the gender of the participants, 24 were male and 76 were female. The sample was comprised of 30 residents of the Chaudière-Appalaches region and 70 from the Quebec City region. It is important to note that when dealing with elderly persons, visual impairment is generally acquired due to ocular illnesses linked to age. In the sample population studied, 76 persons were afflicted with macular degeneration, 9 with glaucoma, 7 with diabetic retinopathy, 6 with optical atrophy, 1 with a cataract, and 1 with a retinal detachment. The World Health Organization classifies visual impairment into two large categories of severity. According to the classification, 84 persons in the sample had a decrease in vision and 16 were considered as being blind. The average interval of the entire elapsed time corresponding to the number of calendar days between the first and the last interventions of the sample group was 238 days (SD = 126 days; range between 43 and 627 days). On average, 6.19 lifestyles (SD = 2.94; range between 1 and 12) were retained for each patient in his individualized treatment plan. On average, the Functional global profile score for the T1 time was 534.43 (SD = 33.15; range between 444.61 and 586.75). Using the unitary cost of activities and the actual number of hours dedicated for treatment of the sample population, the full operating costs were calculated for the entire study group. It appears that the full operating cost for the patients was $6,074.57 (SD = $4,333.40; range between $937.09 and $21,244.06).
Analysis of Results

The first step consisted of identifying the factors that influenced the intervention of services by using a multivariate regression. Table 1, below, presents the results of the model retained with a sample population of 100 observations.

### Table 1

Results of the Regression Analysis; Dependent Variable: FOC (N=100)

<table>
<thead>
<tr>
<th>Model</th>
<th>Pred. sign.</th>
<th>Unstandardized coefficients</th>
<th>Standardized coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>B</td>
<td>Standard error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>FGP(_{ij})</td>
<td>(\alpha_1) (-)</td>
<td>-87.791</td>
<td>8.225</td>
<td>-0.691</td>
<td>-10.673</td>
</tr>
<tr>
<td>AGE(_j)</td>
<td>(\alpha_2) (?)</td>
<td>5.315</td>
<td>34.913</td>
<td>0.009</td>
<td>0.152</td>
</tr>
<tr>
<td>GENDER(_j)</td>
<td>(\alpha_3) (?)</td>
<td>1,445.036</td>
<td>580.899</td>
<td>0.143</td>
<td>2.488</td>
</tr>
<tr>
<td>TIME(_j)</td>
<td>(\alpha_4) (?)</td>
<td>10.113</td>
<td>2.148</td>
<td>0.295</td>
<td>4.708</td>
</tr>
<tr>
<td>Constant</td>
<td>(\alpha_0) (?)</td>
<td>49,805.640</td>
<td>5,268.526</td>
<td>9.453</td>
<td></td>
</tr>
</tbody>
</table>

R = 0.835; R\(^2\) = 0.697; R\(^2\) adjusted = 0.684

F = 54.576 et p = 0.000

*** p \leq 0.001; ** p \leq 0.05; * p \leq 0.1 (one-tailed test when the sign is predicted).

*** p \leq 0.001; ** p \leq 0.05; * p \leq 0.1 (two-tailed test when the sign is not predicted).

The results of the model retained are significant and demonstrate an R\(^2\) adjusted by 68.40%. The estimated coefficient of three variables is significant and directly associated with the full operating costs. In the first place, the estimated coefficient of the Functional global profile at admission is negative (-87.791) and thus significant (p \leq 0.001; one-tailed test when the sign is predicted). This result allows the supposition that the Functional global profile at admission seems to have a significant impact on the full operating costs. It is possible to translate this result into an increase of full operating costs by $87.79 per level of the Functional global profile. In other words, the more the Functional global level is affected (FGP\(_{ij}\) decreases from the theoretical score of 600), the more the patient uses health care resources.

Secondly, the estimated coefficient of the total elapsed time of services (TIME\(_j\)) is positive (10.113) and thus significant (p \leq 0.001; two-tailed test when the sign is not predicted). This result indicates that the total elapsed time of services offered seems, as well, to have an impact on the full operating costs. This result can be interpreted as an increase in the operating costs of resources incurred by $10.11 for each supplementary service that is extended to patients. Finally, concerning gender, the estimated coefficient of this variable is positive (1,445.04) and thus significant (p \leq 0.01; two-tailed test when the sign is not predicted). This allows forecasting that gender, as well, has a significant impact on the operating costs for patients. This result can be interpreted as an increase in costs incurred of $1,445.04 when services are provided to males versus females. Finally, the results of the retained model demonstrate that the age of patients does not seem to be related to the full operating costs. The estimated coefficient associated with this variable is not significant.

The multicollinearity between the independent variables does not seem problematic in the context of this model. In effect, for the independent variables, (Functional global profile, age, gender, and time) the tolerances obtained by the collinearity diagnostic are, respectively, 0.795, 0.950, 0.966, and 0.787. For the same variables, the variant inflation variables are, respectively, 1.257, 1.053, 1.036, and 1.270. Hence,
the tolerances as well as the variant inflation variables are, in themselves, acceptable. All values are within the prescribed limits; that is, superior to 0.1 for the tolerance and inferior to 10 for the variant inflation factor. Furthermore, the White test (1980) did not detect the presence of heteroscedasticity.

The step-by-step regression technique was used to identify the variables having the greatest possibilities of explaining the variance of the dependent variable. By introducing the four variables of the original model in the step-by-step regression analysis, the results demonstrate that only the variables relative to the Functional global profile at admission (FGP_T1), along with the type (GENDER_j) and time (TIME_j) were retained, and in the specific order mentioned. The variable representing the age of the patients was not retained. Withdrawing this variable did not translate into a decrease of explicative or predictive performance. Considering these results, it should be logical that the Functional global profile at admission is the most distinguishing or discriminating variable in the development of the classification.

The second part concerned the development of a classification. To do this, a statistical analysis was conducted using the software AnswerTree, version 3.1. Since the objective is to produce a classification based on full operating costs, the results of the regression analysis presented above were included to define the parameters in the decision tree. The distribution of patients into related groups was realized based on three discriminate variables (FGP_T1, GENDER_j and TIME_j) in function of the full operating costs. The classification method retained was the "Chi-square Automatic Interaction Detection." The procedure consists of a successive and automatic partitioning of the sample into hierarchical structures that minimize the residual variance for the dependent variable; that is, the costs of the resources utilized. The procedure of segmentation in two continues until there are no more significant segmentations with a margin of error higher than 5%. Figure 1 presents the decision tree regarding the sample population.

The results of this procedure have demonstrated that the only independent variable relative to the Functional global profile seems discriminate for this classification. Starting with the Functional global level at admission, five categories were determined. Patients whose functional global profile were inferior to 481 incurred an average cost of $13,813 (node 1). Patients whose functional global profile varied between 481 and 529 incurred an average cost of $7,843. They form the patients in the second category (node 2). Patients whose functional global profile varied between 529 and 547 incurred an average cost of $5,552 and are found in the third category (node 3). Patients whose functional global profile varied between 547 and 573 incurred an average cost of $3,563 and are grouped in the fourth category (node 4). Finally, patients whose functional global profile was superior to 573 incurred an average cost of $1,609. They were placed in the last category (node 5).
Apart from the ISO-SMAF classification system developed for elderly person with a loss of autonomy, there is actually no existing classification system of the Functional related group type in Quebec specifically designed for the rehabilitation of the physically impaired. Thus, in cases where the classification system developed for the program design of this study appears viable, it could serve as a model to be applied to other types of physical impairments and therefore provide a very useful tool for managers of health care establishments as well as a guide for government officials who must define the parameters for budgetary allocations that are just and equitable for all health care establishments in the field of rehabilitation of the physically impaired.

The classification system presented in the section entitled "Results" brings a new viewpoint in the sense that it is no longer a physical impairment that defines the appropriate treatment and the resulting resources to be invested but rather the requirement to respond to the needs of the handicapped person. This approach corresponds to the program desired by rehabilitation establishments for the physically impaired. In effect, the government budget allocation method is presently based on historical data
whereas health care establishments for the rehabilitation of physical impairments find it more realistic that the allocation be based on the needs of handicapped persons.

In addition, such a classification system should satisfy, simultaneously, the needs of patients, health care providers, administrators, public servants, and politicians. Therefore, at the clinical level, the identification of the resources required to improve the Functional global profile of the patient is accomplished by consensus between the patient and the health care team that, together, define the most appropriate intervention plans in order to distribute the services responding to the specific needs of the patient. At the administrative and political levels, it will be possible to incorporate and analyze the data stream emanating from the classification systems of each establishment, territory, and regional authority as well as the provincial level in order to properly plan the required human, material, and financial resources. At the same time, these classification systems should facilitate the decisional and evaluation process at all levels. They would permit public servants of the Ministry of Health and Social Services to eventually generate more judicious reports for the development of health care policies.

The development of a classification system based on the Functional related group can, without a doubt, contribute to improving the budgetary control for health care programs in physical impairment. The proposed model is based on the Measure of progression in rehabilitation as part of the conceptual program of the Disability creation process. Considering its increasing use in different activity fields such as rehabilitation, the evaluation and planning of policies and programs, and the statistical inquiries of the Quebec government but also its use in France, Sweden, and in Switzerland, there is an increasing tendency to believe that the interest in budgetary control tools are growing rapidly thus underlining the importance of the model proposed in this experimentation.

Finally, like all studies that comprise limits, let us mention the principal element regarding the sample size. Despite the fact that the sample respects certain norms insofar as the size of the type of analysis conducted, the number of observations is relatively small, principally, in order to develop a classification system based on the "Chi-square Automatic Interaction Detection." A much larger sample is desirable to refine and increase the viability of the proposed system. Nevertheless, an experimentation should encourage us to conduct a much larger and expansive study that would include all types of physical impairment and that would permit a larger number of observations to validate the model by dividing sample sizes. One part of the sample would be used to construct the model and the other part to validate the results.
Appendix 1: General Process in Rehabilitation of Physical Impairment

The general process of rehabilitation is composed of 5 steps:

1. The diagnostic-treatment step consists of stabilizing vital signs (0-72 hours) and introduces and intensive functional rehabilitation as soon as the health of the person permits.
2. The intensive functional rehabilitation step begins treatments within the first 24-72 hours and can continue up to a limit of 120 days depending on the severity level of the incapacities related to the impairment.
3. The step adaptation-rehabilitation covers, notably, functional rehabilitation, development of psychosocial autonomy, school or professional integration, and the support of autonomy in their environment. The duration of this step is quite variable depending on the problematic and evolution of the person.
4. The actualization of learning and maintaining of this knowledge depends, in part, on the adaptation-rehabilitation and the support for integration.
5. Complementing the interventions for adaptation-rehabilitation, persons having a physical impairment may benefit from support programs aimed at retaining acquired essentials to ensure their long-term effects on the social, learning, professional, and residential levels.

Adapted from MSSS. 1992
Appendix 2: Disability Creation Process - Life habits, personal factors and environmental factors

- Disability Creation Process (DCP).

  Risk Factors
  Cause

<table>
<thead>
<tr>
<th>Personal Factors</th>
<th>Environmental Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organic Systems</td>
<td>Capabilities</td>
</tr>
<tr>
<td>Integrity</td>
<td>Impairment</td>
</tr>
<tr>
<td>Ability</td>
<td>Disability</td>
</tr>
<tr>
<td>Facilitator</td>
<td>Obstacle</td>
</tr>
</tbody>
</table>

Interaction

Life Habits

Social Participation Handicap Situation


- List of items relating to dimensional "life habits".

  1. Diet
  2. Food Preparation
  3. Meals
  4. Hygiene
  5. Health Care
  6. Mental Fitness
  7. Physical Fitness
  8. Dressing
  9. Short Distance Mobility
  10. Transports
  11. Oral and body communication
  12. Written communication
  13. Telecommunication
  14. Signs
  15. Lodging
  16. Home Maintenance
  17. Affective Relationships
  18. Social Relationships
  19. Family Responsibility
  20. Financial Responsibility
  21. Community Life
  22. Recreation
  23. Education
  24. Employment

The accomplishment scale of life habits

<table>
<thead>
<tr>
<th>Level of Accomplishment</th>
<th>Type of Assistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>6. No difficulty</td>
<td>4. No Assistance</td>
</tr>
<tr>
<td>5. With Minor difficulty</td>
<td>3. Assistive device or Adaptation or Human Assistance</td>
</tr>
<tr>
<td>4. With Moderate difficulty</td>
<td>2. Occasional Human Assistance + Assistive device or</td>
</tr>
<tr>
<td>3. With Major difficulty</td>
<td>Adaptation</td>
</tr>
<tr>
<td>2. Accomplished by a proxy</td>
<td>1. Steady Human Assistance + Assistive device or</td>
</tr>
<tr>
<td>1. Not accomplished</td>
<td>Adaptation</td>
</tr>
</tbody>
</table>
List of items relating to dimensional "personal factors".

1. Intellectual Capabilities
   Attention and concentration
   Mnesia
   Thought
2. Language Capabilities
   Speech
   Understanding Oral Language
   Understanding Sign Language
   Understanding Written Language
   Lip-Reading
   Oral Language Expression
   Sign Language Expression
   Written Language Expression
   Pragmatic
3. Behaviour Capabilities
   Volition
   Affective
   Behaviour
4. Touch
5. Interceptive Functions
6. Hearing
   Auditory Perception
   Auditory Discrimination
   Auditory Identification
7. Vision
   Detail Vision
   Spatial and Movement Vision
   Ocular motor Control
   Visual Perception
8. Motor Activity Capabilities
   Voluntary Body Part Movements
   Postural Development and Control
   Equilibrium
   Coordination
   Deglutition
   Manual Activities
   Walking
9. Tolerance and Resistance Capabilities

Measurement scale of personal factors

<table>
<thead>
<tr>
<th>Severe Disability</th>
<th>Type of Assistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severe Disability</td>
<td></td>
</tr>
<tr>
<td>4. Limitless Ability</td>
<td>3. No Assistance</td>
</tr>
<tr>
<td>3. Slightly Limited Ability</td>
<td>2. Human or technological Assistance</td>
</tr>
<tr>
<td>2. Significantly Limited Ability</td>
<td>1. Human and Technological Assistance</td>
</tr>
<tr>
<td>1. Incapable</td>
<td></td>
</tr>
</tbody>
</table>

List of items relating to dimensional "environmental factors".

1. Family Structures
2. Social Network
3. Residential Buildings
4. Financial Security
5. Pre-school and Academic Instruction
6. Workplace
7. Physical, Household, and Psychosocial Support
8. Transportation services
9. Technology
10. Urban Development
11. Climate

Scale of measure of environmental factors

<table>
<thead>
<tr>
<th>Appreciation on the accomplishment of a person’s life habits</th>
<th>Obstacle or Facilitator Assessment Scales</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Facilitator (+)</td>
<td>3. Minor</td>
</tr>
<tr>
<td>2. No Influence</td>
<td>2. Moderate</td>
</tr>
<tr>
<td>1. Obstacle (-)</td>
<td>1. Major</td>
</tr>
</tbody>
</table>
References


