

A NATION-WIDE PROJECT FOR THE REVISION OF THE BELGIAN NURSING MINIMUM DATASET: FROM CONCEPT TO IMPLEMENTATION

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Abstract. This paper describes the process of revising the Belgian Nursing Minimum Data Set (NMDS). The study started in 2000 and will be implemented in 2006. The project is divided in 4 major phases. The first phase (June – October 2002) implied the development of the conceptual framework based on literature review and secondary data-analysis. The Nursing Interventions Classification (NIC) was selected as framework for the revision of the NMDS. The second phase focused on the language development (November 2002 – September 2003) with panels of clinical experts (N=75) for six care programs. They indicated hospital financing, nurse staffing allocation and assessment of the appropriateness of hospitalization as priorities of a revised B-NMDS. A draft instrument with 84 variables, using NIC, was developed during this period. This leads to an alpha version of a revised NMDS. The third phase (October 2003 – December 2004) focused on the data collection and validation of the new tool. The new NMDS was tested on 158 nursing wards in 66 Belgian hospitals from December 2003 until March 2004. This test generated data for some 95.000 inpatient days. The interrater-reliability of the revised NMDS is tested. The criterion-related validity of the revised NMDS is compared with the actual NMDS. The discriminative power of the revised NMDS is tested to select the most relevant items for data collection. This will result in a beta version of revised NMDS in December 2004. The records of the revised NMDS are linked with the hospital discharge dataset and other mandatory datasets to integrate the revised NMDS in the broader health care management. The fourth phase (January – December 2005) will focus on information management.

Key words. Nursing Minimum Data Set, Nursing care management, Nursing Interventions Classification, Diagnostic related groups.

1. Introduction and Background:

Belgium has a 15-year tradition of computer hospital data collection. It developed its Hospital Discharge Dataset (HDDS) in the 1980's and started full implementation in the 1990's. The dataset holds a set of relevant clinical information (primary and secondary diagnosis, procedures, length of stay, ..) for each patient discharged from an acute Belgian hospital. Also, Belgium is still one of the few countries that complement this HDDS with a nationwide uniform Nursing Minimum Dataset (NMDS) for a balanced sample of inpatient days. This NMDS data allows investigating nursing care and interventions and nurse staffing from 1987 onwards [1]. The mandatory registration resulted in an extensive dataset of more than 15 million selected in-patient days for some 6 million selected patients in all 2.500 nursing units in all Belgian hospitals. Nevertheless, the applications in clinical

practice and health care management are still limited and touch only small part of the information available in the NMDS. The main application remains the use of the NMDS in determining some percentage points of the budget of the hospital. A few hospitals already use the data set to guide their staffing decisions. On the other hand, the evolutions in health care and nursing care in particular demand to update the NMDS. The Ministry of Public Health commissioned a research project to the Catholic university of Leuven and the University Hospital of Liège to revise the Belgian Nursing Minimum Dataset (NMDS) for six care programmes (Cardiology, oncology, geriatrics, chronic care, paediatrics and intensive care) [2]. The study started in 2000 and will end in 2006 with the implementation of the revised NMDS.

The revision aims to take into account the changes in nursing practice, the international development of nursing languages and classifications, the changes in healthcare management and the need for integration with the hospital discharge dataset.

2. Methodology and procedure

To change is much more difficult than to start from scratch. For the revision of the B-NMDS a very strict plan is followed based on two main streams: 1) using panels of expert nurses and NMDS-coordinators to build the acceptability of the tool and 2) making use of existing and new empirical nursing data for developing a high-quality valid and reliable tool.

The project is divided in four major phases: 1) conceptualisation, 2) language development, 3) data collection and tool validation and 4) information management.

Each of these four consecutive phases will be discussed in this paper.

2.1 Phase I: Development of the conceptual framework

The first phase (June – October 2002) implied the development of the conceptual framework based on literature review and secondary data-analysis. The Nursing Interventions Classification (2nd Edition) or NIC was selected as framework for the revision of the NMDS. NIC is a comprehensive, research-based, standardised classification of interventions that nurses perform [3]. The 433 interventions in NIC (2nd Edition) are grouped into 27 classes and six domains for ease of use. This nursing language was selected for the revision of the Belgian NMDS because of strong validation work, the existence of the instrument in French and Dutch, the international use of the classification which allows further benchmarking and the fact the classification has been tested before in Belgian home care [4].

2.2 Phase II: Language development

The second phase focused on prioritizing future application domains and language development (November 2002 – September 2003) with panels of clinical experts (N=75) for six care programs. Previous NMDS experience highlights the need to balance the considerable costs of registration with real-life improvements in nursing care and/or nursing management. It is only genuine to propose the registration of new data when the data of the existing NMDS or other related data sets seem insufficient to update existing indicators or to develop new ones.

First, the working groups had to concentrate on the selection of meaningful nursing care and nursing management indicators rather than to focus on individual data elements. They indicated hospital financing, nurse staffing allocation and assessment of the appropriateness of hospitalization as priorities of a revised NMDS. Secondly, the clinical experts of the 6 care programs selected the most relevant NIC interventions. All were studying the NIC classification. They selected the NIC interventions that are present in their current practice and indicated the relevance of each intervention for inclusion in a future nursing *minimum* dataset with the previous nominated priorities. In total 256 interventions, out of 433 were selected in at least 1 or more care programs. In a second phase, the results were presented to the clinical experts of each care program. Completeness of the items was discussed and level of detail of measurement of the items was determined by the experts. All existing B-NMDS items (3) were listed and mapped into one framework: the NIC framework with domains, classes and interventions. NMDS items were put in the right NIC domains and classes. NIC interventions were used to produce NMDS-items and response categories based on information of the six care program expert panels. This set of NMDS-items was pre-tested by the researchers in more than 3 wards per care programme and more than 15 different hospitals. This led to an alpha version of a revised NMDS with 87 variables.

2.3 Phase III: Pilot-test and tool validation

The third phase (October 2003 – December 2004) focused on data collection, validation of the new tool and the integration with the HDDS.

2.3.1 Data collection:

Hospitals were solicited to participate in the study. This call for participation resulted in a total of 85 applying hospitals (69% of all Belgian acute hospitals) with 244 nursing wards. For feasibility reasons a selection was made based on well-defined selection criteria: equal regional and national distribution, balance between small and large hospitals, even number of private and public hospitals, teaching and non-teaching hospitals and an equal portion of wards for each care program. Hence, 66 Belgian hospitals with 158 nursing wards were participating in this test. Each hospital appointed a project coordinator who is responsible for organization of education, data collection, data input and data transmission to the research teams. These coordinators had previous experience with the NMDS and with data handling.

The revised NMDS (alpha version) still uses a balanced sample of inpatient days and one-day hospitalisations. The alpha version of the revised NMDS was collected for some 95.000 inpatient days during thirty days and three registration periods (1-15 December 2003, 1-5 February 2004, 1-10 March 2004). The current NMDS and HDDS for the patients included in this sample were also forwarded to the research team.

2.3.2 Reliability and validity:

Validity and reliability are important issues to consider when developing a new tool. In this study interrater reliability, criterion related-, construct-, face- and content validity are investigated. [5]

The *interrater-reliability* of the revised NMDS was tested on three points in time. Before each registration period the 66 coordinators were asked to score two written cases,

describing the patient condition and nursing care given during one patient day. The six cases covered the six care programmes and included 60 of the 87 variables of the alpha version NMDS. The research team developed a gold-standard score per case. The scores of the coordinators were compared with the gold-standard scores.

The *critereon-related validity* of the revised NMDS is compared with the actual NMDS. This criterion-related validation approach, aims to objectively validate the revised NMDS in comparison with the actual NMDS. The rationale for this approach is that the similar elements of the revised tool should give at least the same results as the previously validated actual NMDS. First, the data collected with the revised tool during two of the three pilot-periods (December 2003 and March 2004, N=+/- 80 000 records) were coupled with the data of the available data from the actual NMDS. After a coupling based on common identifiers (patient number, date ...), a database of 20.000 records was available for the comparison. After that, these coupled-data were recoded, item by item (the 23 items of the actual NMDS), by the research team, so that the data definitions in both datasets were as similar as possible. RIDIT-analysis was used to standardize these variables so that the distributions of all variables could be easily compared. More-over the RIDIT transformation is traditionally used to analyse the NMDS so that the impact of the revised NMDS could be assessed more accurately. RIDIT analysis is an appealing technique for treating ordinal data because the reference distribution can be chosen [6]. Finally, correlation of Spearman-rho and Kendall's tau b correlation coefficients were used to analyse criterion-validity of the next B-NMDS. The analysis was performed on three levels: items, hospitals and care programs.

The discriminative power of the revised NMDS is tested to investigate the *construct-validity* of the tool. It is investigated how the items of the NMDS (alpha version) measure the expected constructs stated by the clinical experts during phase II of the project. This analysis-round aims to reduce the variables to a manageable number and withhold only those for nationwide registration, which are prerequisite to visualize nursing care for different pathology groups, nursing wards and hospitals. The registration of the revised NMDS follows the NIC^{2nd edition}-classes. Each NIC-class entails one or more variables. The data are analysed, with principal component analyses (CATPCA[®]), in two steps using NIC as a framework. First, data are analysed per NIC-class. These *intra-class* analyses lead to the finding that variables are measuring the same latent variable, the aggregation of some (hierarchical) variables and the selection of variables with the highest discriminative power. In a second step, we repeated these analyses, using *inter-class* analyses to investigate the association of variables between classes. Both types of analysis were done per care program as well as on the total sample. This two-stepped analysis-round, will result in empirical based recommendations: registration guidelines, distinction between general, care-program specific and not-relevant variables.

The results from the interrater reliability, criterion related validity and construct-validity tests will be presented to the clinical experts (October – November 2004) to assure *face-validity* of the revised NMDS. They will discuss all the proposals of the researchers and suggest improvements based upon their clinical expertise and nursing care management experience. Based on these empirical test-results and the opinions of the clinical experts adjustments to the NMDS (alpha version) will be suggested.

A last component includes the cross-check of the selected NMDS variables with existing instruments in the literature to guarantee *content-validity*. Some specific updated NMDS variables should allow a patient classification system. This system will guide the allocation of staff within the different hospital wards on a daily and long-term basis. To assess the appropriateness of hospitalization we include the variables of the Belgian Appropriateness Evaluation Protocol in the updated B-NMDS. The NMDS-concepts will also be mapped

with the NIC taxonomy and language. This will eventually result in a beta version of revised NMDS in December 2004.

2.3.3 Integration of the NMDS with the HDDS:

The NMDS-records are linked with the hospital discharge dataset. By linking both datasets we aim to develop a methodology to link the nursing data with diagnostic related groups (DRGs) in a logical and meaningful way and we also aim to measure the variability of nursing care per DRG. This data linking allows not only investigating the calendar time which is important from an organisational perspective (e.g. nurse staffing, weekend-staffing...), but also the clinical time (e.g. pre-operative or post-op inpatient days for surgery patients; 5th, 10th chemical therapy inpatient days for oncology patients; etc.). As a result, the NMDS allows for a management as well as a clinical perspective of investigation. A main application is a relative estimation of the type and intensity of nursing care per APR- DRG for each hospital and its care programmes. This will be done by linking the length of stay, the day of major surgical procedure, the day of chemical therapy,... from the HDDS with the nursing care and intervention data, staff and qualification data,... per day-of-stay from the new NMDS. The national data constitute the benchmark to delineate the frame of reference for each APR-DRG and to compare each hospital's specific situation. The methodology will be tested on a set of high-volume APR-DRGs. Identifying the key medical events and mapping the nursing data in this clinical timeframe, are key for evaluating each hospital's care processes. The analysis holds the evaluation of the consistency/variability of the nursing activity per day of stay, the degree of redundancy/uncertainty embedded in the HDDS and new NMDS datasets and the degree to which that both datasets allow meaningful monitoring of the whole care process. The study will help to understand how medical and nursing data interrelate. This understanding will be integrated in the final revised NMDS. The integration of medical and nursing data will lead to new applications for healthcare policy and management.

2.4 Phase IV: Developing information management applications

The fourth phase (January – December 2005) focus on information management. The beta version of the Revised B-NMDS will be piloted in a small number of hospitals for a wide range of departments to evaluate the external validity of the revised dataset. Linking the B-NMDS with the hospital discharge dataset will provide nursing profiles per DRG. Applications for hospital financing and nurse staff allocation will be developed. The B-NMDS will be incorporated in the evaluation of the appropriateness of stay in the hospital. Feedback and audit modules will be build. ICT-support in collecting and analysing the data will be developed. Adaptation in legislation to allow this revised data-collection will be prepared. In January 2006, nation-wide implementation of the dataset is foreseen.

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