Evaluation of Physiotherapists' Documentation: a Retrospective Record Analysis before the Implementation of National Recommendations in the EHR system

Kristiina Häyrinen

University of Eastern Finland, Kuopio, Finland

Abstract

Objectives: The purpose of this study was to describe and evaluate how physiotherapists have documented patient care in EHR and especially the use of national headings in this documentation and the applicability of classifications in physiotherapy practice in the neurological care setting before the implementation of national recommendations for standardized structure of EHR. Methods:This retrospective study included 1,364 physiotherapists' notes documented in EHR systems in a central hospital in Finland during the period 2003-2005. This electronic documentation was analyzed using deductive content analysis and statistical methods. Results: Headings were used for the physiotherapy documentation. The use of different headings varied between physiotherapists' notes and the use of headings was inconsistent. Discussion: Physiotherapists' documentation has many shortcomings. Physiotherapists' documentation does not describe whole care process. Use of free text in documentation does not support searching, summarizing, decision support, or statistical analysis. Conclusion: There is a need to use classifications in physiotherapy documentation. The National Classification of Physiotherapy Practice is suitable to document physiotherapists' interventions and the use of ICF in documentation might provide more detailed information about physiotherapy practice. ICF is more applicable classification in physiotherapy documentation than the National Classification of Physiotherapy Practice.

Keywords: Documentation; Electronic Health Records; Evaluation; Classification

1   Introduction

Health information technologies (HIT) and applications such as electronic health record (EHR) systems have been shown to improve the quality of care by increasing adherence to guideline or protocol-based care [1,2]. According to earlier studies the use of EHR system benefits physiotherapists. The use of the EHR system was conducive to more accurate and comprehensive documentation by physiotherapists. Furthermore, improved storing, processing and information retrieval capabilities improved interdepartmental communication and providing data for future research has been reported. Data standardization and commitment to use terminologies are further key factors for success in implementing EHR systems in physiotherapy practice settings [3]. The use of classifications facilitates automated aggregation and summarizing of data for the reuse of this data in discharge summaries and referrals. Moreover, decision support can be integrated in EHRs [3-5]. The use of classifications also facilitates aggregation and reuse of

data for administrative purposes, statistical analysis or clinical research, i.e. quality reporting [6] or the use of EHR data for health outcomes research [7]. The need to systematically organize, store, retrieve, and disseminate data is evident. The free text form causes barriers in searching, summarizing, decision support, or statistical analysis. Information extraction from narrative documents of an EHR is still rarely in use outside the laboratories where information extraction systems have been developed. [8]

There has been wide interest in standardizing the content and structure of EHR in national projects all over the world and the European Union has also taken account of this in the eHealth Action Plan [9,10]. One important part of the content and structure of EHR is physiotherapy documentation. The standardized physiotherapy documentation model based on the care process model. The care process model in electronic physiotherapy documentation included four phases: needs assessment, setting of physiotherapy diagnoses and care aims, planning and delivering physiotherapists' interventions, and the evaluation of outcomes [4, 11-14]. The needs assessment phase of the care process includes the patient's health data. This assessment is made by the physiotherapist who examines the patient and discusses with him/her. The phase of the care process for setting physiotherapy diagnosis, the aims for care, and expected outcomes are based on assessment data. The phase of planning and delivering the physiotherapy interventions of the care process consists of optimally planned and delivered interventions to achieve expected outcomes. The phase of evaluating outcomes includes the physiotherapy outcomes achieved. In addition to the use of care process, classifications are needed in order to standardize physiotherapy documentation.

The International Classification of Functioning, Disability and Health (ICF) is used for functional status assessment, goal setting and treatment planning and monitoring, likewise for outcome measurement in physiotherapy documentation. ICF is a classification of health and health-related domains and provides a common and standard language for describing health-related functioning. Numerous studies have been published on ICF [15]. The aim of most of these earlier studies has been to explain or criticize the conceptual framework and /or structure of ICF, apply the ICF concepts to management or link ICF to existing measurement instruments of functional ability. Moreover, core data sets for different diseases have been identified and validated [15-17]. The ICF has also been applied to data collection on functional status [15].

The National Classification of Physiotherapy Practice serves as a language for physiotherapists to document patients' physiotherapy in Finland. The classification is also used to compile statistics on physiotherapists' other activities such as acting as experts or educational activities or development and management activities. The National Classification of Physiotherapy Practice consists of three levels: six main categories, 29 sub-categories and qualifier items. Four main categories of classification, namely "Physiotherapeutic examination and assessment" "Counseling and therapeutic activities in physiotherapy" "Physiotherapy services supporting clients in their living" and "Working environment and additional physiotherapy activities connected to client services" are used to document patients' physiotherapy. Physiotherapists use subcategories or qualifier items of classification in their documentation and complementary free text.

In Finland EHR systems are in use comprehensively at all levels of the Finnish health care system [18] and physiotherapists document in EHR systems [19]. EHR systems are not usually interoperable. In 2002, the Finnish Government decided to introduce nationwide EHRs and the National Health Project Program was launched, including national EHR development project [20]. In a national EHR development project have been defined the unified longitudinal (continuing) content of EHR as well as the legal requirements for patient record documentation. The unified content of EHR has been defined on the basis of proposals to manual paper-based patient records and the information content of EHR systems used. [21] Agreement on a national unified structure of the EHR was reached by means of nationwide consultation and expert groups. The national recommendations and guidelines were agreed on in 2007 [20] and proposals for physiotherapists' unified documentation in 2009. The HL7 Finland Association has defined how this information is to be expressed in the CDA R2 structure, which has been adopted as the standard for data exchange. The aim was to achieve semantic interoperability of health care information systems. The standardized physiotherapy documentation model has not been implemented in different EHR systems.

In Finland the standardized unified structure of EHR consists of the documents of different health care specialties and professions such as physiotherapy. Within the documents meaningful sets of data are organized into groups according to the clinician's actions. These groups of data items have headings e.g. patient history or status. Headings provide the context for narrative text, e.g. [22] and under the heading are core data elements e.g. functional status (structured data entries) which requires the use of classifications such as ICF or National Classification of Physiotherapy Practice [23] in documentation. ICF has been proposed as a common

reference framework for functioning in documentation. The national classifications are available through the national code server.

So far only a few studies have focused on the content of physiotherapists' documentation in EHR [2, 3, 11, 13, 19, 24]. Therefore there is a need to evaluate information on documentation made by physiotherapists. The focus of previous studies concerning physiotherapy documentation has been the quality of documentation [11,19]. The documentation has been evaluated against differing criteria. Earlier studies on the quality of physiotherapists' records have revealed weaknesses in documentation practices [11, 13, 21] and the physiotherapists have not always recorded their thoughts during the care process [13]. The content of physiotherapy documentation was moreover logically presented in only half of the documentation and the use of headings was incoherent [19]. The need for studies focusing on data elements such as data granularity, timeliness as well as data completeness and accuracy has been noticed [6]. Moreover, research is needed on how the use of standardized physiotherapy documentation model will affect physiotherapy documentation practice. The purpose of this study is to describe and evaluate how physiotherapists have documented in EHR and especially the use of headings in this documentation and the applicability of classifications in physiotherapy practice in the neurological care setting before the implementation of the Finnish national recommendations for standardized structure of EHR. This study aims to answer the following questions:

1. To what extent have physiotherapists used headings in documentation?

2. What main categories of the National Classification of Physiotherapy Practice can be identified in physiotherapists' documentation?

3. What chapters of the International Classification of Functioning, Disability and Health (ICF) can be identified in physiotherapists' documentation?

2   Methods

This retrospective, descriptive study on physiotherapy documentation was part of a larger study. The study was carried out by analyzing data collected from an EHR system from 2003 to 2005. Data included all entries of inpatients documented by physiotherapists in EHR in the neurological care setting. Most of the patients in this study had suffered a stroke. The site for this research was the North Karelian Central Hospital. The EHR system was used by health care professionals from 2000 until the end of 2009. Physiotherapists can record data both as free text and free text separated with headings. Physiotherapists can use the local headings in their documentation. The approval for the research was granted by the director of the North Karelian Hospital District. Patients were not directly involved in the study. Patient data were anonymous; a unique patient identifier was assigned to each record by the study site. This ensured the confidentiality of the patient records. Data was processed by the first author and thus were not seen by outsiders.

This study can be characterized as a formative, standard-based evaluation which took place before the Finnish recommendations on EHR had been implemented in information systems. The framework of the reference standard for evaluation was based on earlier studies [4, 11-14] and on the Finnish recommendations for unified structure of EHR (Fig 1). The aim was to compare the documentation practice to this standard. The results of this study can be utilized at the study site to improve quality of physiotherapy documentation, and also in further national development work.

The physiotherapists at the study site did not use the National Classification for Physiotherapy Practice in their documentation and therefore in this study was identified subcategories of the classification in physiotherapists' documentation (see Table 1).

In this study ICF was used as a tool for the examination of the physiotherapists' documentation in EHR. The linking rules reported by Cieza and co-workers were applied [25]. The linking rules are guidelines which enable concepts contained in physiotherapists' documentation to be linked to the ICF in a standardized manner. First all meaningful concepts within physiotherapists' documentation were identified then meaningful concepts were linked to corresponding chapters (first level of category) of ICF. In order to link physiotherapy documentation to the National Classification of Physiotherapy Practice, all meaningful words, phrases or sentences contained in the physiotherapists' documentation were identified and categorized to corresponding subcategories of the National Classification for Physiotherapy Practice. An example of linking is presented in Table 1. The linking rules and mapping to ICF and to National Classification of Physiotherapy Practice were discussed with the physiotherapists in order to validate the use of rules.

The data were extracted from the EHR system database by the hospital's information management personnel and the researcher received it in ASCII format. First the data were processed in Excel tables where the duplicates could be deleted. The duplicates were due to misuse of the EHR system and did not contain new in-

Data Item	Component of ICF	Chapters of ICF	Subcategory of National Classification for Physiotherapy Practice
Live alone in detached house	Personal factor	Personal factor	-
Previous mobility and functional status has been good.	not definable	not definable	-
facial paresis dextri	Body structure	Structures of nervous system	-
Still tired	not definable	not definable	Physiotherapeutic assessment (RF120)
Speaking in an undertone	Body functions	Voice and speech function	Physiotherapeutic assessment (RF120)
occasionally pain in head and nauseous	Body functions	Sensory functions and pain Functions of the digestive, metabolic and endocrine systems	Physiotherapeutic assessment (RF120)
Needs help changing body position. e.g. raising himself into a sitting position, standing up.	Activities	Mobility	Physiotherapeutic assessment (RF120)
Maintaining sitting position	Activities	Mobility	Physiotherapeutic assessment (RF120)
Maintaining standing position	Activities	Mobility	Physiotherapeutic assessment (RF120)
Walking short distances	Activities	Mobility	Physiotherapeutic assessment (RF120)
Needs support in walking	Environmental factors	Services, systems and policies	Physiotherapeutic assessment (RF120)
the power of left side muscles is lower than right side	Body functions	Neuromusculoskeletal and movement-related functions	Physiotherapeutic assessment (RF120)

Table 1: Example of linking physiotherapists' documentation to ICF concepts and to National Classification for Physiotherapy Practice.
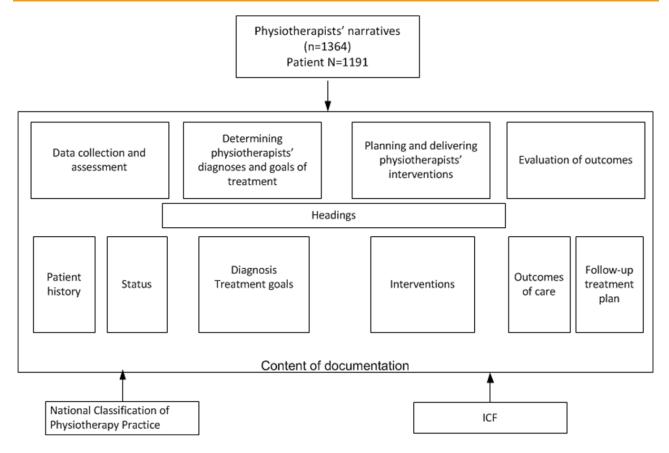
Figure 1: Study design

formation. Then the data was analyzed using deductive content analysis to identify headings used, categories of the National Classification of Physiotherapy Practice and chapters of the ICF (Fig 1). Statistical software SPSS® 14.0 (Statistical Package for the Social Sciences; SPSS Inc., Chicago, IL, USA) was used for the analysis and descriptive statistical methods.

3 Results

The study sample consisted of 1,364 physiotherapists' notes on 1,191 patients in a neurological care setting (Fig. 1). This documentation made by physiotherapists was also applied in discharge summaries (n=698) to discharge organizations. Eight physiotherapists, one rehabilitation assistant (eight notes) and three physiotherapy students (six notes) under control of their instructor had recorded mainly one note per patient in the EHR during care episode. Thus the documentation comprised information of more than one physiotherapy event.

3.1 Use of headings in documentation

The physiotherapists had structured their notes with headings in 99% of their documentation. The number of headings used varied across documentations. In some

documentation only one heading was used, but in some notes the narrative text was structured with seven headings (mean 3). The frequencies of the most used actual headings are shown in Table 2. "Patient history" "Status" and "Follow-up treatment plan" headings were applied more frequently in physiotherapy documentation.

In some cases the physiotherapists used more detailed headings e.g. "Age" (n=9) in patient history documentation or "Conclusions" (n=24), which comprised summaries of patients' functional status in health status documentation. Physiotherapists had applied synonyms for headings such as "Treatment plan" and "Follow-up care plan" (18 %) in their documentation. The physiotherapists had also documented in status documentation results of tests performed e.g. the Berg Balance Test, the Box and Block test, the Straight Leg Raising test, measurement of hand grip strength or Visual Analogue Scale.

3.2 Subcategories identified of the National Classification of Physiotherapy Practice

The physiotherapy documentation (n=1,364) identified 4,005 subcategories of the National Classification of Physiotherapy Practice. The most identified subcategories in documentation were "Physiotherapeutic as-

Heading	n	%
Reason for care	24	2
Patient history	1067	78
Status	1009	74
Intervention	67	5
Outcomes of care	9	1
Follow-up treatment plan	1097	80
Summary of care	303	22
Distribution of documents	10	1

Table 2: Most used actual headings in physiotherapists' documentation (N=1364).

sessment" and "Writing the physiotherapy plan". Table 3 presents the subcategories of the National Classification of Physiotherapy Practice identified in the documentation and the actual headings under which the information was entered.

All main categories of the National Classification of Physiotherapy Practice intended for documenting patients' physiotherapy were identified in the physiotherapy documentation. The subcategories "Physiotherapeutic assessment" and "Counseling and therapeutic activities in physiotherapy" dominated the subcategories in the documentation.

3.3 Chapters identified of the ICF

The frequencies of chapters of ICF in physiotherapists' documentation are presented in Figure 2. Physiotherapists' documentation also included personal details such as age, gender, lifestyle, education, profession which could not yet be mapped to ICF. Personal factors were recorded under the heading "Patient history".

4 Discussion

This study shows that physiotherapists structured narrative text with headings. The use of different headings varied between physiotherapists' notes and the use of headings was inconsistent, which was also found in an earlier study [19]. This study reveals that physiotherapists structured their documentation with headings "Patient history" "Status" and "Follow-up treatment plan". The use of these headings in documentation does not support documenting the physiotherapists' entire decision-making process. In the documentation physiotherapists should also use the headings "Physiotherapy Diagnoses" "Treatment goals" "Interventions" and "Outcomes of care". Although in Finland physiotherapists do not use the term physiotherapy diagnoses in their documentation, under the heading "Status" can be documented information about patients' needs and problems identified based on subjective and objective

data gathered. Headings are needed in order to achieve the reported benefits of EHR namely analyzing and reviewing patient outcomes [3] and in turn ensuring comprehensive documentation. Furthermore, identification of goals for treatment interventions and outcomes of care in documentation is easier while using headings than narrative text.

The physiotherapists also used synonymous headings. The use of synonyms like "Treatment plan" and "Follow-up treatment plan" in headings might be because unified structure for documenting physiotherapy in the organization had not been agreed on. On the other hand, the use of synonyms might also distract from the applicability of local headings used. However, a unified manner of recording patient care and the use of unified headings facilitate the locating of clinical content information in the same location [6] and make it easier to share data between health care professionals and between health care organizations [3].

Earlier studies have revealed shortcomings in physiotherapists' documentation [11,19] and otherwise the EHR system has been noted to have improved documentation [3]. According to this study the documentation of physiotherapy is not comprehensive. Only a few notes described the goals of the physiotherapy. The documentation of interventions provided and the outcomes of physiotherapy were scarce. Furthermore, the physiotherapists did not exactly describe what interventions were provided. Implementing the unified structure of EHR in information system could support physiotherapists in documenting all meaningful information about patient care.

The use of classifications in EHR systems has been shown to benefit physiotherapists [3]. Classifications are needed for applying decision support e.g. evidence-based guidelines in EHR systems. Moreover, the use of classifications in documentation facilitates the reuse of data for administrative purposes or research. In this study site classifications were not used in physiotherapy documentation. Therefore, in this study subcategories of the National Classification of Physiotherapy

	Heading Status		Intervention		Outcomes of care		Follow-up treatment plan		Summary of care			
Main and subcategories of National Classification of Physiotherapy Practice	n	%	n	%	n	%	n	%	n	%	Total	%
Physiotherapeutic examination and assessment (RF1)												
Physiotherapeutic assessment in orientation (RF110)	0	0	0	0	0	0	0	0	0	0	0	0
Physiotherapeutic assessment (RF120)	1010	75	29	2	7	1	5	0	288	22	1339	33
Writing the physiotherapy plan (RF130)	29	2	10	1	0	0	1095	87	129	10	1263	32
Counseling and therapeutic activities in physiotherapy (RF2)												
Physiotherapeutic guidance and counseling (RF210)	36	13	32	11	0	0	112	40	103	36	283	7
Therapeutic exercises (RF220)	168	53	31	10	1	0	5	2	110	35	315	8
Manual therapy (RF230)	11	42	1	4	1	4	4	15	9	35	26	1
Electrical and thermal procedures (RF240)	12	34	5	14	0	0	7	20	11	31	35	1
Other counseling and therapeutic activities in physiotherapy (RF290)	0	0	0	0	0	0	0	0	0	0	0	0
Physiotherapy services supporting clients in their living and working environment (RF3)												
Services supporting mobility and functional capacity with assistive devices (RF310)	37	17	17	8	0	0	123	56	41	19	218	5
Services supporting management in domestic life and living environment (RF320)	0	0	0	0	0	0	0	0	0	0	0	0
Physiotherapy services supporting management in work (RF330)	0	0	0	0	0	0	0	0	0	0	0	0
Other services supporting management in domestic life and living environment (RF390)	0	0	0	0	0	0	0	0	0	0	0	0
Additional physiotherapy activities connected to client services (RF4)												
Information acquisition (RF410)	0	0	0	0	0	0	0	0	0	0	0	0
Documentation (RF420)	0	0	0	0	0	0	0	0	0	0	0	0
Inter-professional collaboration (RF430)	18	3	8	2	0	0	430	82	70	13	526	13
Physiotherapeutic consultation (RF440)	0	0	0	0	0	0	0	0	0	0	0	0
Other additional physiotherapy activities connected to client services (RF490)	0	0	0	0	0	0	0	0	0	0	0	0
Total											4005	100

Table 3: Subcategories of the National Classification of Physiotherapy Practice identified in physiotherapists' documentation.

Figure 2: Frequencies of ICF chapters identified in physiotherapists' documentation (N=1364)

Practice were identified in physiotherapy documentation. According to the findings of this study almost all subcategories of the National Classification of Physiotherapy Practice can be identified in physiotherapists' documentation. The most identified subcategories of classification were "Physiotherapeutic Assessment" and "Writing the physiotherapy plan". The number of subcategories related to therapeutic activities was scarce due to physiotherapists' documentation, such as physiotherapy provided. These phrases could not be linked to subcategories of the classification.

In the physiotherapy documentation the most identified components of ICF were "Body functions", "Activities" and "Environmental factors". The dominating chapters of these components were "Sensory Functions and Pain" "Neuromusculoskeletal and Movement-Related Functions" "Structures of the Nervous System" "Mobility" "Products and Technology" and "Services, Systems and Policies". These findings are evident due the fact that most of the patients in this study sample had suffered a stroke, although medical diagnoses could not be taken into account in the analysis. According to earlier studies impairments in movement function and mobility as well as use of assistive devices were frequent among patients with neurological conditions [16,17]. The use of ICF can be promoted e.g. by implementing ICF Core Sets in EHR systems. ICF Core Sets lists all relevant categories which should be measured in specific diseases and makes easier to use ICF in documentation [15]. Different standardized measurements were used for physiotherapeutic assessment. The documentation by the physiotherapists included detailed descriptions of these measurements. All these standardized instruments are part of EHR [24] and should be

implemented in EHR systems. Thus physiotherapeutic assessment documentation included the scores and conclusions drawn on the basis of these measurements. In future one challenge is take account of different standardized instruments of functional ability linked to ICF [15] in developing EHR systems [14].

Some issues concerning the validity and reliability of the study must be discussed. The physiotherapy documentation was evaluated only by the author, which may affect the reliability of the results. However, linking was validated by the physiotherapist. The evaluator was external to the organization. The scope of the study was limited to a neurological care setting in specialized care in one health care organization. Since the results reflect the physiotherapists' documentation in this care specialty, generalization of the results across other care specialties or primary care cannot be made with any confidence. The results of this study can be utilized at the study site to improve the quality of physiotherapy documentation, and also in national development work. This study shows that introduction of the national recommendations will change the physiotherapy documentation habits.

However, this study showed that physiotherapists use headings in structuring their documentation. The use of headings was inconsistent and due to this the physiotherapists' decision-making process is difficult to ascertain in the documentation. Moreover, the National Classification of Physiotherapy Practice was suitable to describe the conclusions of physiotherapy assessment, interventions provided and physiotherapy services supporting clients in their living and working environment in physiotherapy documentation. At the study site the need of theoretical training on the subject of using care process

as a framework of documentation is evident. The challenge in future will be commit physiotherapists to use national headings and classifications in documentation and to document all phases of the physiotherapy process. The National Classification of Physiotherapy Practice is not intended to record the goals of physiotherapy or the outcomes of physiotherapy and this must take account in national development work. ICF is more applicable classification in physiotherapy documentation than the National Classification of Physiotherapy Practice. The use of ICF in documentation gave more detailed information than the use of National Classification of Physiotherapy Practice. Moreover, ICF is intended to use in physiotherapy documentation for functional status assessment, goal setting and treatment planning and monitoring, likewise for outcome measurement.

In future, when implementing national recommendations in EHR systems physiotherapists' workflow and the structure of physiotherapists' documentation must be taken into account [4]. The need for future evaluation research on physiotherapy documentation is obvious when the national guidelines on headings and classifications for physiotherapy documentation are adopted in EHR system.

5   Conclusion

Physiotherapists' documentation has many shortcomings. Physiotherapists structured their documentation with headings. Thus physiotherapists' decision-making process is difficult to ascertain in documentation. To improve physiotherapy documentation education and training should be provided on the use of national recommendations e.g. use of headings and classifications in documentation and on the importance of documentation. The National Classification of Physiotherapy Practice is suitable for documenting physiotherapists' interventions. The use of ICF in documentation might provide more detailed information about physiotherapy practice and ICF is more applicable classification in physiotherapy documentation than the National Classification of Physiotherapy Practice.

Conflicts of Interest

None declared.

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Correspondence

Kristiina Häyrinen
Kuntien Tiera. Oy,
kristiina.hayrinen@gmail.com