A Nursing-Specific Model of EPR Documentation: Organizational and Professional Requirements

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**Purpose:** To present the Norwegian documentation KPO model (quality assurance, problem solving, and caring). To present the requirements and multiple electronic patient record (EPR) functions the model is designed to address.

**Methods:** The model’s professional substance, a conceptual framework for nursing practice is developed by examining, reorganizing, and completing existing frameworks. The model’s methodology, an information management system, is developed using an expert group. Both model elements were clinically tested over a period of 1 year.

**Results:** The model is designed for nursing documentation in step with statutory, organizational, and professional requirements. Complete documentation is arranged for by incorporating the Nursing Minimum Data Set. A systematic and comprehensive documentation is arranged for by establishing categories as provided in the model’s framework domains. Consistent documentation is arranged for by incorporating NANDA-I Nursing Diagnoses, Nursing Intervention Classification, and Nursing Outcome Classification.

**Conclusions:** The model can be used as a tool in cooperation with vendors to ensure the interests of the nursing profession are met when developing EPR solutions in healthcare.

**Clinical Relevance:** The model can provide clinicians with a framework for documentation in step with legal and organizational requirements and at the same time retain the ability to record all aspects of clinical nursing.

[Key words: electronic patient record, documentation model, nursing terminologies]
and in Norway the task of preparing requirement specifications for the prototype has been delegated to the Norwegian Centre for Informatics in Health and Social Care (KITH). The specifications are meant to ensure that minimum requirements for EPRs are met, and that standards and nomenclatures implemented meets the International Organization for Standardization (ISO) standards.

The main function of the patient record is to support and document patient treatment and thereby include functions for recording, updating, erasing and retrieving information (KITH, 2001). One specific KITH requirement is that EPRs must be organized based on user need, which requires close cooperation with professionals who will use the record.

In Norway, documentation in the patient record is regulated by the Health Personnel Act (1999) which contains specific sections concerning how authorized healthcare personnel are to document healthcare. The act defines documentation as recording, classification, and presentation of patient data. In a separate regulation (The Norwegian Patient Record Regulation [Forskrift om pasientjournal], 2000, § 8) the act requires the following elements be made explicit in documentation: patient’s status with underlying observations, assessments and decisions, patient problems, planned interventions, and outcomes. The act also provides instructions about the information form. These instructions include that records must be useable for other healthcare workers and must be made available to the patient, either in a form the patient can read independently, or that the patient can read when assisted by healthcare personnel if technical language is used that is unfamiliar to lay people.

Organizational Documentation Requirements

The healthcare institutions expect an operational EPR system for documentation, administration, and research to be in place as soon as possible (Lunney, 2006; Simpson, 2007; Smith, 2004). As a tool for documentation, the EPR system is expected to render communication between healthcare workers within the institution more effective and to make oral patient handover redundant. For these expectations to be met, focused and detailed information for treatment and care needs to be included in the EPR (Häyrinen & Saranto, 2005).

As a tool for continuity and safety EPR is expected to give a rapid overview of the course of treatment for the individual patient via functions for sorting and retrieving information (Lunney, 2006). This requires information that is classified and ordered in searchable categories and is presented in a format that can be merged with other professionals’ notes.

As a tool for quality assurance of treatment and care, an operational EPR system is expected to give rapid access to decision-support systems and procedure manuals. This requires profession-specific systems arranged in catalogues developed for EPR (Häyrinen & Saranto, 2005). Healthcare institutions are also subject to considerable internal control and have a duty to report to authorities and health registers concerning outcomes, treatment quality, and productivity, a procedure an operational EPR system is expected to render more effective.

The prerequisite that the EPR system incorporates terminologies is a desirable goal of large organizations housing a number of different professions (Rosenbloom et al., 2006; Simpson, 2007). In order for such terminologies to have administrative significance, they must be developed for the user interface in EPR and they must be incorporated into a reference terminology which recognizes, classifies, stores, and retrieves information in the database (Häyrinen & Saranto, 2005; Rosenbloom et al., 2006; Simpson, 2007). Only then can data entered in the patient record be explicit in analyses and reports and be used directly for research and administration purposes.

Professional Documentation Requirements

Previously the nursing profession documented in a separate record and followed its own conventions in respect to both content and form. Today, when documentation is incorporated in a shared electronic record it must be adapted to diverse requirements (Cheevakasemook et al., 2006; Dragon, 2006). To help clinicians cooperate with vendors the Norwegian Nursing Organisation (NSF) has prepared a guide dealing with electronic documentation (NSF, 2007). The focus in this guide is primarily on the completeness of documentation, i.e. that it contains all statutory data elements. The Norwegian nursing academia focuses however to a greater extent on the documentation’s comprehensiveness, i.e. that it reflects all aspects of nursing as a clinical activity (Kärkkäinen et al., 2005; von Krogh et al., 2005).

Documentation Qualities

Documentation Completeness

In nursing there are two different traditions in formal documentation: continual sequential—and process oriented documentation in the form of the care plan (Moen et al., 2002). The ongoing documentation is characterized by notes in free text and traditionally has had few requirements in terms of content (Hardiker et al. 2002). The care plan format is based on Yura & Walsh’s (1988) theory on nursing process. The care-plan format contains the elements: assessment, problems, resources, goals, actions, and evaluation. The care plan format is compatible with the law’s requirements for data elements and with the Nursing Minimum Data Set (NMDS), which are considered minimal and necessary data elements for nursing (Gordon, 1994). The NSF recommends the nursing care services to incorporate both forms of documentation used in combination in EPR in order to fulfill the requirements of the Patient Record Regulation (Health Personnel Act, 1999).

Documentation Comprehensiveness

Nursing is practiced based on an assigned societal role and the documentation is to acknowledge the profession’s areas of responsibility and authority (NSF, 2007).
Consequently the documentation must reflect all types of nursing practice; care of the sick and healthy; in all ages, families, and society (Thoroddsen, 2005). In order to distinguish nursing from other professions, theories have been developed which clarify the nature, aims, and outcomes of nursing practice (Rutty, 1998). The theories are considered norms for practice and accommodate both a problem-solving and humane perspective (Kim, 2000). The problem-solving perspective is explained primarily in theories of human needs (Henderson & Nite, 1997; Orem, 2001) and adaptation models (Roy & Andrews, 1999) in nursing, where the focus is on treatment, symptom control, and help in adaptation. The humane perspective is best explained in existential theories (Travelbee, 1971) and caring theories (Benner & Wrubel, 1989; Eriksson, 2006; Nåden, 2002) in nursing where focus is one of understanding and care for the sick, including easing suffering and giving hope.

The two perspectives require different categories of documentation and different ways of expressing themselves, in order for nursing activities to be comprehensively reflected (Grobe, 1996, Kärrkkäinen et al., 2005). The problem-solving perspective requires categories reflecting human functions and skills of biophysical, psychological and social nature and a text format that is informative and objective with a causal focus. The caring perspective requires categories embracing human feelings and experiences and a text form which enables the expression of individualized care. As individualized care takes its starting point in the understanding of others it requires a format that is declarative and subjective and allows room for interpretation (Kärrkkäinen et al., 2005). Highlighting the caring perspective in documentation is regarded an important issue from a professional point of view, as caring forms the foundation of nursing and in many cases is an objective in itself (Bjørk & Kirkevold, 2000).

Documentation Consistency

Traditionally, nursing, like most other healthcare professions, has used natural language expressions with no requirement for standardization to communicate professional activity (Hellesøe & Ruland, 2001). This has resulted in documentation lacking uniformity and consistency and makes comparison of nursing across wards, hospitals, and geographical areas difficult (Simpson, 2007).

Uniform and consistent documentation depends on a significant language in the form of defined, unambiguous terms, organized as professional terminology. A good professional terminology is capable of both translating the clinician’s natural language expressions into structured cognitive representations formulated on the profession’s perspective, and of reflecting the profession’s knowledge base precisely and completely (Rosenbloom et al., 2006).

Many terminologies have developed in nursing, for use both globally and in specific areas. The best developed terminologies are based on the profession’s own premises and have both a humanistic foundation and a multi-theoretical system of concepts that are ethically and professionally normative. The most internationally recognized terminologies are: NANDA-I Nursing Diagnoses (NANDA, 2007–2008), Nursing Intervention Classification (NIC; McCloskey Dochterman & Bulechek, 2004) and Nursing Outcome Classification (NOC; Johnson, Maas, Moorhead, 2004), comprising concepts capable of giving a balanced picture of patient phenomena, interventions, and outcomes for the entire nursing domain (von Krogh et al., 2005). The terms used in these terminologies are defined concepts which are organized in domains and classes as classification systems and thereby provide the users with a good overview of the terminology’s ability to reflect nursing care. In order to continually increase the ability of nurses to understand patient phenomena, interventions, and outcomes, the NANDA, NIC, and NOC terminologies are frequently presented in new, complete versions, giving the clinicians both new and synonymous terms so that they are better able to express nursing care.

The NANDA, NIC, and NOC terminologies are developed for the user interface in EPR, while the label of each term i.e., the concepts of diagnoses, interventions, and outcomes are developed in compliance with the ISO standard. Further the NANDA, NIC, and NOC terminologies are incorporated in the reference terminology, i.e. the Systematized Nomenclature of Medical Clinical Terms (SNOMED CT), which recognizes, stores, and retrieves the information in the database. Together they constitute the most complete set of standardized nursing data developed to date (Hardiker et al. 2002), a so-called core-data set comprising comparable electronic data that can be exchanged between healthcare information systems. This renders nursing data to be explicit in terms of reporting and makes nursing data suitable for online administration and research (Häyrinen & Saranto, 2005; Simpson, 2007).

The KPO Model—Substance and Methodology

The documentation model KPO (quality assurance, problem solving, caring) is a representation illustrating how nursing can be documented in EPR in compliance with statutory, organizational, and professional requirements. A documentation model displays both a professional substance and a method for processing information (Lund et al., 2002). For clinicians, a documentation model will function as a framework forming the basis for the documentation in step with diverse requirements (Hellesøe & Ruland, 2001).

Model Design

The KPO Model allows two formats for documentation: (a) continual sequential documentation in the form of record notes, and (b) process-oriented documentation in the form of a care plan. In the care plan, which is the clinician’s workstation, data can be entered, cancelled, and stored as historical data (von Krogh & Dale, 2007). The model’s representative language and interface terminology
in EPR is composed of the NANDA, NIC, and NOC terminologies. This gives the documentation a consistent system of concepts that render nursing recognizable in a multidisciplinary record (Thoroddsen, 2005) and a core-data set which can be exchanged between healthcare information systems (Häyrinen & Saranto, 2005).

The Model’s Substantial Elements

The professional substance of the model is a conceptual framework for nursing practice primarily based on a harmonization of the taxonomies of the NANDA, NIC, and NOC terminologies. The method used to develop the framework is thoroughly described by von Krogh et al. (2005): (a) a literature review to examine and validate the taxonomies of the NANDA, NIC, and NOC terminologies; (b) a harmonization of the taxonomies of the NANDA, NIC, and NOC terminologies into a common structure of domains and classes; (c) the development and validation of a preliminary framework using an expert-group and clinical testing; and (d) the development of the final KPO Model conceptual framework.

The conceptual framework is constructed as taxonomy with domains and classes covering the scope of nursing as clinical activity. The framework is aimed at promoting comprehensive documentation, but also forms the model’s structural principle to ensure that the individual clinician documents in the same system throughout the hospital’s system. The framework architecture comprises 8 domains and 29 classes (von Krogh et al. 2005); 98 empirical concepts are derived from the classes to ensure the framework’s empirical linkage.

The framework’s domain labels refer to structures, processes, and patterns of human nature, life, and agency (Kim, 2000) and can be traced to two main paradigms in nursing. Concepts relating to the basic processes and demands of physical, psychological, and social character are mainly derived from human need theories in nursing (Henderson & Nite, 1997, Orem, 2001) and Roy’s adaptation model (Roy & Andrews, 1999). Concepts relating to life experiences and coping are mainly derived from existential theories in nursing (Travelbee, 1971) and caring theories (Benner & Wrubel, 1989; Eriksson, 2006). By comparing, reorganizing, and completing existing frameworks for nursing practice, the KPO model framework forms a factor isolating theory delimiting nursing as clinical activity, organized as taxonomy (von Krogh et al., 2005).

A decision-support system was developed in extension of the conceptual framework and tested in parallel: (a) An assessment guide was developed by adding two levels to the conceptual framework, empirical concepts, and clinical indicators; (b) a nursing diagnosis guide, an intervention guide, and an outcome guide was developed by reorganizing the NANDA, NIC, and NOC labeled phenomena into the KPO model’s conceptual framework structure; and (c) three catalogues comprising care-planning templates were worked out (von Krogh & Dale, 2007).

The decision-support system is the model’s quality assurance system and aid to clinical reasoning. The system is important given that the accountability of clinical decision-making is expected to increase significantly with the introduction of EPR within the healthcare services (Dragon, 2006). The system’s main function is to facilitate rapid organization of patient data and to validate the use of terminology concepts. To narrow the scope of search, the guides and care planning templates are organized in three catalogues with different foci: psychiatric care catalogue, somatic care catalogue, and elderly care catalogue.

The Model’s Methodology

The information flow in EPR is managed by four structures: Patient Status, Work Plan, Outcome, and Information Exchange (see Table 1) and is processed in two ways: As

<table>
<thead>
<tr>
<th>Information structure</th>
<th>Patient Status</th>
<th>Work Plan</th>
<th>Outcome</th>
<th>Information Exchange</th>
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<tbody>
<tr>
<td>Information type</td>
<td>Notes</td>
<td>Care plan</td>
<td>Outcome measuring</td>
<td>Notes</td>
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<td>Information modality</td>
<td>Functional status notes</td>
<td>Nursing diagnoses (NANDA)</td>
<td>Nursing outcomes (NOC)</td>
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<td></td>
<td>Physiological status notes</td>
<td>Nursing Interventions (NIC)</td>
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<td>Psychocognitive status notes</td>
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<td>Environmental status notes</td>
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<td>Information format</td>
<td>Structured free-text</td>
<td>Nomenclature concepts</td>
<td>Nomenclature concepts</td>
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<td>■ free-text activities</td>
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Table 1. The KPO Model Information Management System
free-text in the form of notes and as terms chosen from the nomenclatures.

The method used to develop the information management system was: (a) A review of legal, organizational, and professional EPR requirements; (b) the use of an expert group of 25 nurses to develop and validate the model's information structures and text formats; and (c) clinical testing over a period of 1 year on five test sites to ensure the functionality of information structures and text formats (von Krogh et al., 2005; von Krogh & Dale, 2007).

The Patient Status structure arranges for notes organized in mutually exclusive categories as provided by framework domains in order to achieve easily retrievable information. In the notes section nurses document patient information as clinically observable indicators, judgments and a clinician's decisions as required by law. Because the notes have a significant amount of detail, they form the basis for accurate diagnosing, which in turn forms the basis for the choice of outcomes and nursing interventions (Florin et al., 2005; Lunney, 2006). The text format to be used is structured free text, a format suitable for arranging information into clinical metanarratives. This format frames information in analytic mode, a form in which each sentence provides unity using professional language and particular concepts (Sakalys, 2003). Clinical metanarratives are aimed at rendering more effective exchange of information between healthcare workers, and for that reason is not particularly reader-friendly for the patient.

The Work Plan is the clinicians' workstation and arranges selected nursing diagnoses and interventions in two separate care plan modalities. The care plan is based on a “non-linear problem solving” principal, which implies that diagnoses and interventions are not linked together, a layout contrary to the procedure described by Johnson et al. (2006) in the NANDA, NOC, and NIC Linkages and chosen to preclude clinicians from selecting diagnosis-centred, rather than patient-centred interventions. The text format for the Work Plan comprises NANDA and NIC concepts. In order to render patient phenomena and nursing interventions more patient-specific, the terms are given a subordinated free-text, where the NANDA diagnosis is attributed a sentence which specifies and individualizes the diagnosis, and each NIC intervention is given a set of activities designed for the individual patient.

The Outcome structure arranges selected outcomes in order to express the effect of the clinician’s interventions in relation to the individual patient. The only outcomes to be selected are those corresponding with aspects considered as focused information in Patient Status notes. By systematically measuring outcomes in relation to individual patient’s outcome measurement, nurses furnish data that can also be used for research or other purposes (Johnson, Maas, & Moorhead, 2004). The Outcome’s text format comprises NOC concepts with clinical indicators. The NOC indicators are not individualized as outcomes can only be measured against a given standard.

The Information Exchange structure arranges for notes organized in narrative, thematic form. The structure comprises two types of notes: Pathway notes (Admission notes, Summary notes, Conference notes, Transfer notes, Discharge notes) and Event notes (Daily report note, Telephone note, Home visit note, Outpatient note). Pathway notes document the patient’s health status and progress and nursing care delivered over a period of time. The Event notes indicate the patient’s innermost experiences, and the clinician’s interventions to respond to the patient’s requests. The format to be used in both types of notes is narrative text, a format suitable for arranging information into narratives with a beginning and an end (Sakalys, 2003). This format is a form where the entire story provides the unity, using global and holistic concepts. It provides descriptions that give lay people insight into the healthcare process and can easily be read and understood by the patient. Table 2 shows the modes of documentation in the KPO Model.

### Discussion

It is important to ensure that EPR systems introduced in healthcare meet the interests of the nursing profession. In Norway, EPR systems have been introduced, whereby the clinicians are not supported by technology but rather driven by it, despite the NSF’s guide, requirement specifications from KITH, and legislation governing the content of such documentation.

An example of a system that does not give clinicians a satisfactory framework for complete and comprehensive documentation is the Gerica system from TietoEnator, which lacks categories for patient status and nursing diagnoses. In the DIPS ASA system, clinicians are able to position information into nursing-relevant functional areas, but the

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#### Table 2. Modes of Documentation in the KPO Model

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<tr>
<th>Mode</th>
<th>Analytic</th>
<th>Narrative</th>
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<tbody>
<tr>
<td>Information structure</td>
<td>Patient status</td>
<td>Work-plan outcome</td>
</tr>
<tr>
<td>Information modality</td>
<td>Assessment notes</td>
<td>Nursing diagnoses</td>
</tr>
<tr>
<td>Information level of abstraction</td>
<td>Particularistic descriptions</td>
<td>Nursing interventions</td>
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<td></td>
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<td>Nursing outcome Concepts</td>
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<td>Information exchange</td>
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<td>Pathway notes</td>
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<td>Event notes</td>
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categories are not mutually exclusive and the categorization is not exhaustive.

There are also nursing modules built on the belief that nursing can only be documented in the same way as in the old paper record i.e., in humanistic natural language such as that found in the nursing module of the DocuLive system from Siemens. Turning the paper-based record into an electronic form is, according to Häyrinen & Saranto (2005), a way of designing the nursing module in the early phases of the development of EPR. This type of design currently entails, in addition to inconsistent documentation, consequences for the exploitation of potential uses of healthcare technology. Lack of professional terminology in nursing documentation can therefore be perceived as a threat to the nursing profession as a visible player in the healthcare arena (Frisch & Kelly, 2002).

An Ideal EPR Documentation Model

A model capable of guiding development of the nursing module in EPR must have its developmental starting point in statutory, organizational, and professional requirements. The model’s functionality must be validated through clinical testing (Goorman & Berg, 2000). Structures and formats must have properties enabling complete, comprehensive, and consistent documentation. Categories designed to ensure documentation completeness must include the Nursing Minimum Data Set, which, according to ICN, is necessary and essential data for describing, comparing and researching nursing practice. Of these, the core data set must be standardized in the form of consistent terms for nursing diagnoses, interventions, and outcomes, such that nursing activities can be generated and used in an administrative context (Häyrinen & Saranto, 2005). As framework for documentary comprehensiveness, the model must be based on a theory of nursing practice (von Krogh et al., 2005). This theory must be organized as taxonomy, in which mutually exclusive categories facilitate focused and easily retrievable information, and where gaps in information can easily be uncovered. The model must also provide theory-based textual patterns to enable communication of nursing activity using different expressions and a representative language that facilitates consistency of documentation. The representative language in the form of professional terminologies is also an important tool for the construction of nursing knowledge, provided that the terminologies contain representations of all forms of nursing activity (Thoroddsen, 2005).

A terminology which is not nursing-specific, but which covers organizational requirements and might be introduced for use by all professions in the healthcare services is International Classification of Functions (ICF), developed by WHO. ICF conceptualizes functions and skills, but does not contain terms for experiences and views of life, which are important aspects of nursing. When these aspects cannot be conceptualized in the documentation, introduction of ICF in the healthcare services will have significant consequences for the development of nursing knowledge.

Professional terminology used must have distinct concepts for diagnoses, interventions and outcomes for use in the interface, something International Classification for Nursing Practice (ICNP), developed by ICN, lacks. ICNP is a multi-axial classification whereby the clinician constructs statements for diagnoses, interventions, and outcomes by choosing modalities from different axes. This procedure, whereby the clinician in each individual case is expected to develop a cognitive representation for a given phenomenon, is demanding in terms of knowledge, energy, and time (Ferrario, 2003). Also, ICN is thought to have acknowledged the problem and now wishes to develop catalogues containing commonly used statements for diagnoses, interventions, and outcomes—a time consuming process expected to take years. ICNP currently has problems finding its place in the healthcare service and also will have no administrative significance as long as it remains unincorporated in a reference terminology.

Experiences With the KPO Model

Experiences with the quality assurance, problem solving, and caring (KPO) model have thus far shown that the model gives clinicians good contextual and structural frameworks, but challenges them in terms of format. It has proven difficult for clinicians to use the right text format, a problem most likely related to prior training since the documentation format has not normally been addressed in education, an assumption supported by findings in the study by Törnvall et al. (2004). The problems deal first and foremost with the ability to classify information, but also with the ability to describe wholes. In respect to the latter, the clinicians are believed to lack concepts, an assumption supported by several studies of nursing documentation (Moen, 2001).

Concepts for describing nursing on an abstract level are normally acquired through studies of the conceptualization of nursing theories, of the naming of patient phenomena, and the role and function of the nurse. The significance of these concepts for documentation is probably insufficiently emphasized in nursing education. A minor problem is the clinician’s capability to choose correct terms for diagnoses, interventions, and outcomes. This problem is perceived more as a transitory phenomenon that will disappear over time by virtue of increased focus and use in practice. At the Faculty of Nursing, Oslo University College, students are given tuition and training in the formulation of text in different text formats as well as training in use of the nursing terminologies, NANDA, NIC, and NOC. The software developed (based on the KPO model) is an important tool in this context, since computerized documentation skills are also necessary in order to meet today’s challenges in the healthcare service (Dragon, 2006; Lunney, 2006). Because the faculty graduates approximately 400 nursing degree students annually, the hope is that the quality of nursing documentation in Norway will increase in the years to come.
Conclusions

An operative EPR system is both an information and communication tool for clinicians in day-to-day patient care and a tool for the organization. In order for a tool to be functional, the information data entered in the record must be regulated in terms of content and form. The KPO Model is designed to meet a statutory and organizational requirement, but also to meet nursing interests. The model creates the necessary conditions for complete documentation through incorporation of NMDS and consistent documentation by incorporation of the nursing terminologies NANDA, NIC, and NOC. In order to provide frameworks for comprehensive documentation, the model has a conceptual framework developed as a theory for nursing practice. The model’s functionality has been developed and validated in cooperation with clinicians at Ullevål University Hospital, Psychiatric Division where the model helps organize the nursing module in EPR. Data from five of the hospitals wards is gathered in a pre-test, post-test design to examine changes in documentation practises and the quality of documentation. The results of the study will be published in near future.

Clinical Resources

NANDA: www.nanda.org
NIC and NOC: www.nursing.uiowa.edu/excellence

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